Circuit-Breaker IZM

Operating Manual

05/09 AWB1230-1407GB

MOELLER

An Eaton Brand

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See revision protocol in the "About this manual" chapter

Production: Heinz Werner Schimanke, Heidrun Riege
Translation: Nigel Green, David Long

Printed on bleached cellulose. 100 % free from chlorine and acid.

Warning!
Dangerous electrical voltage!

Before commencing the installation

- Disconnect the power supply of the device.
- Ensure that devices cannot be accidentally restarted.
- Verify isolation from the supply.
- Earth and short circuit.
- Cover or enclose neighbouring units that are live.
- Danger if spring is charged! Discharge spring.
- Follow the engineering instructions (AWA/AWB) of the device concerned.
- Only suitably qualified personnel in accordance with EN 50110-1/-2 ;VDE 0105-100 may work on this device/system.
- Before installation and before touching the device ensure that you are free of electrostatic charge.
- Connecting cables and signal lines should be installed so that inductive or capacitive interference do not impair the automation functions.
- Suitable safety hardware and software measures should be implemented for the I/O interface so that a line or wire breakage on the signal side does not result in undefined states in the automation devices.
- Deviations of the mains voltage from the rated value must not exceed the tolerance limits given in the specifications, otherwise this may cause malfunction and dangerous operation.
- Emergency stop devices complying with IEC 60204-1, EN 60204-1 must be effective in all operating modes of the automation devices. Unlatching the emergency-stop devices must not cause restart.
- The electrical installation must be carried out in accordance with the relevant regulations (e. g. with regard to cable cross sections, fuses, PE).
- All work relating to transport, installation, commissioning and maintenance must only be carried out by qualified personnel. (IEC 60364, HD 384, VDE 0100 and national work safety regulations).

Contents

0 About this manual

List of modifications

Edition date	Page	Description
10/02	All	Revision of complete manual
06/05	All	Revision of complete manual
08/07	All	Revision of complete manual
05/09	All	Revision of complete manual

Note

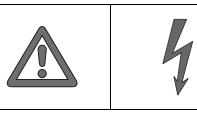
These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired or should particular problems arise which are not covered sufficiently for the Purchaser's purposes, the matter should be referred to the local Eaton Sales Office.

Our After Sales Service personnel are available for maintainance or retro-fitting of your circuit-breakers. To contact After Sales Service: → chapter 26.

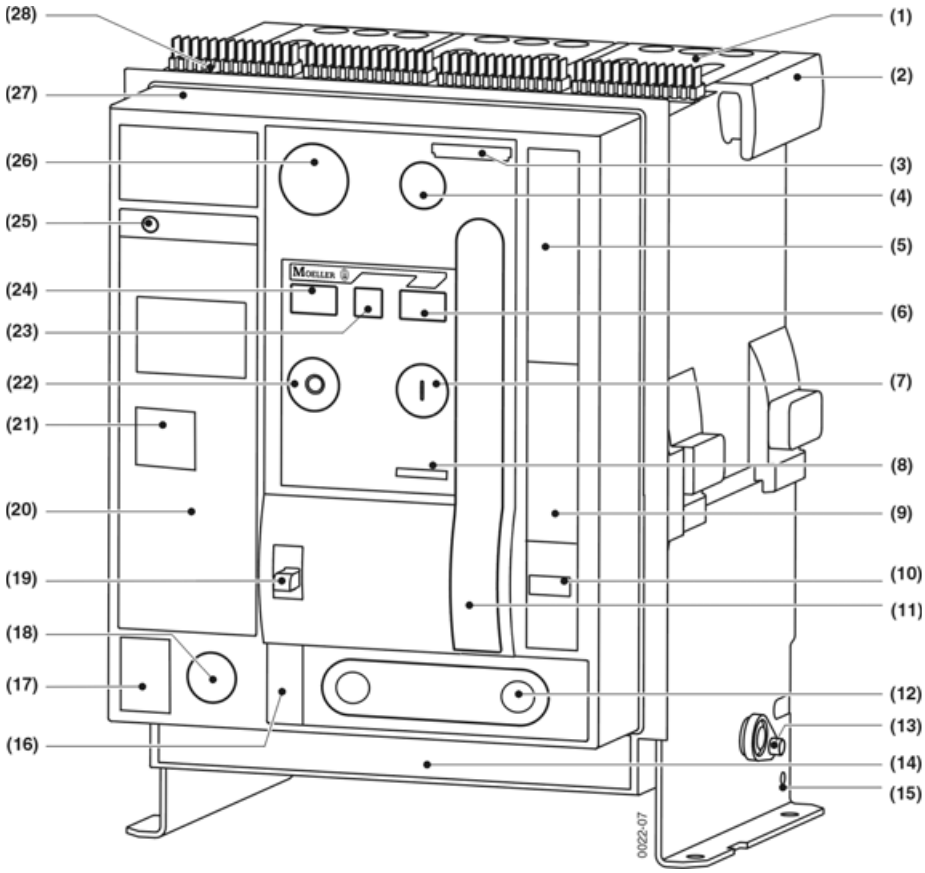
	Danger
	**Hazardous voltage!** **Can cause death or serious personal injury as well as damage to device and equipment.**
	Before working on this device the system must be switched off. Danger if spring is charged! Discharge spring.

Symbols

	Warning
	Dangerous electrical voltage!
	Safety warning
	Danger by crane transport
	Warning against personal injury
	Danger of injury
	CE-mark
	Flathead screwdriver
	Philips cross recess (type H) Pozidrive (type Z)
	Hexalobular internal driving bit
	Hexagon socket screwdriver
 **10 Nm**	Tightening torque M_A
	Cable tie
	Complete by hand
1	First step of action sequence

1 Construction

1.1 Circuit-breaker



(1) Arc chute → page 24 – 4
(2) Carrying handle
(3) Identification tags
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(5) Circuit-breaker label → page 2 – 1
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(7) “Mechanical ON” button
(8) Part no.
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(17) Earth-fault tripping table (→ page 9 – 17)
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(21) Rating plug → page 9 – 35
(22) Mechanical OFF button **or** Emergency-Stop pushbutton (option) → page 14 – 3
(23) Ready-to-close indicator → page 6 – 4
(24) Switch position indicator → page 6 – 4
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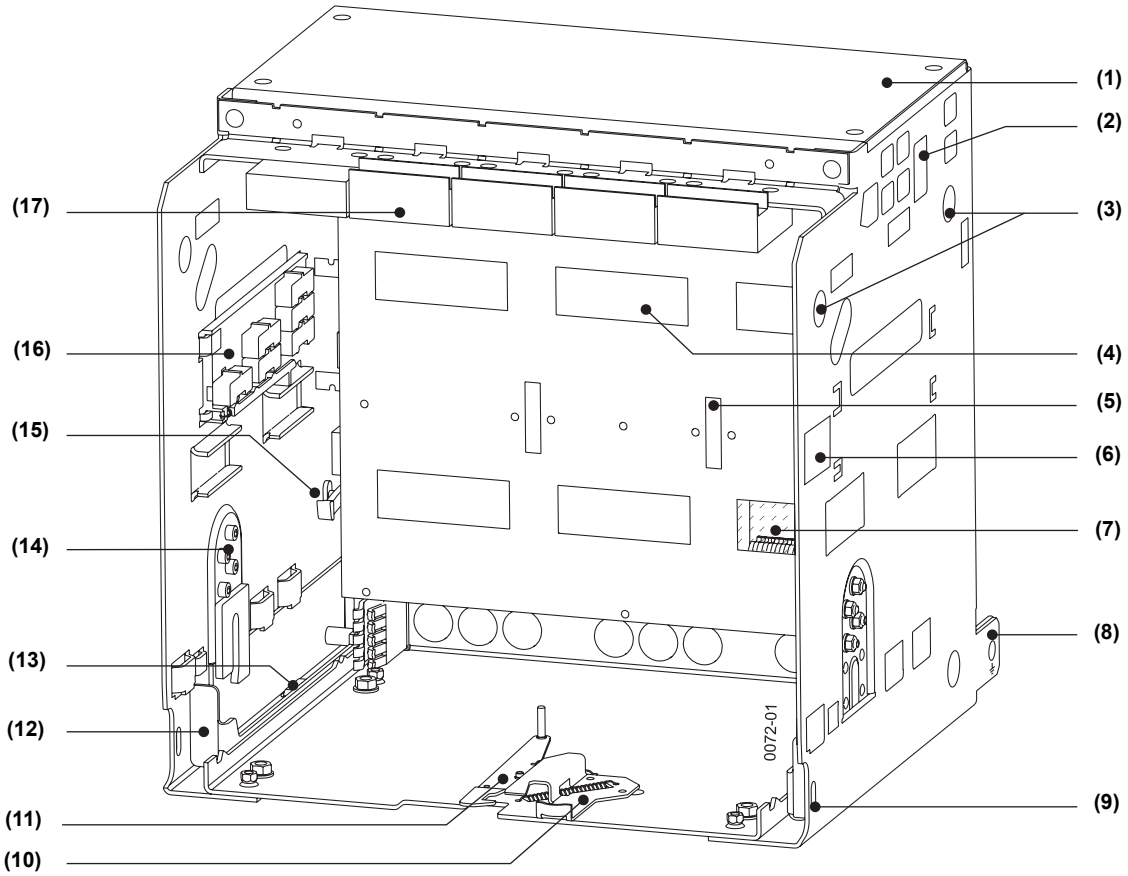
(26) Locking device, “Safe OFF” position (option) → page 15 – 4
(27) Front panel → page 24 – 6
(28) Plug connector for auxiliary contacts → page 5 – 16

1.2 Withdrawable unit



(1) Arcing chamber cover (option) → page 21 – 1
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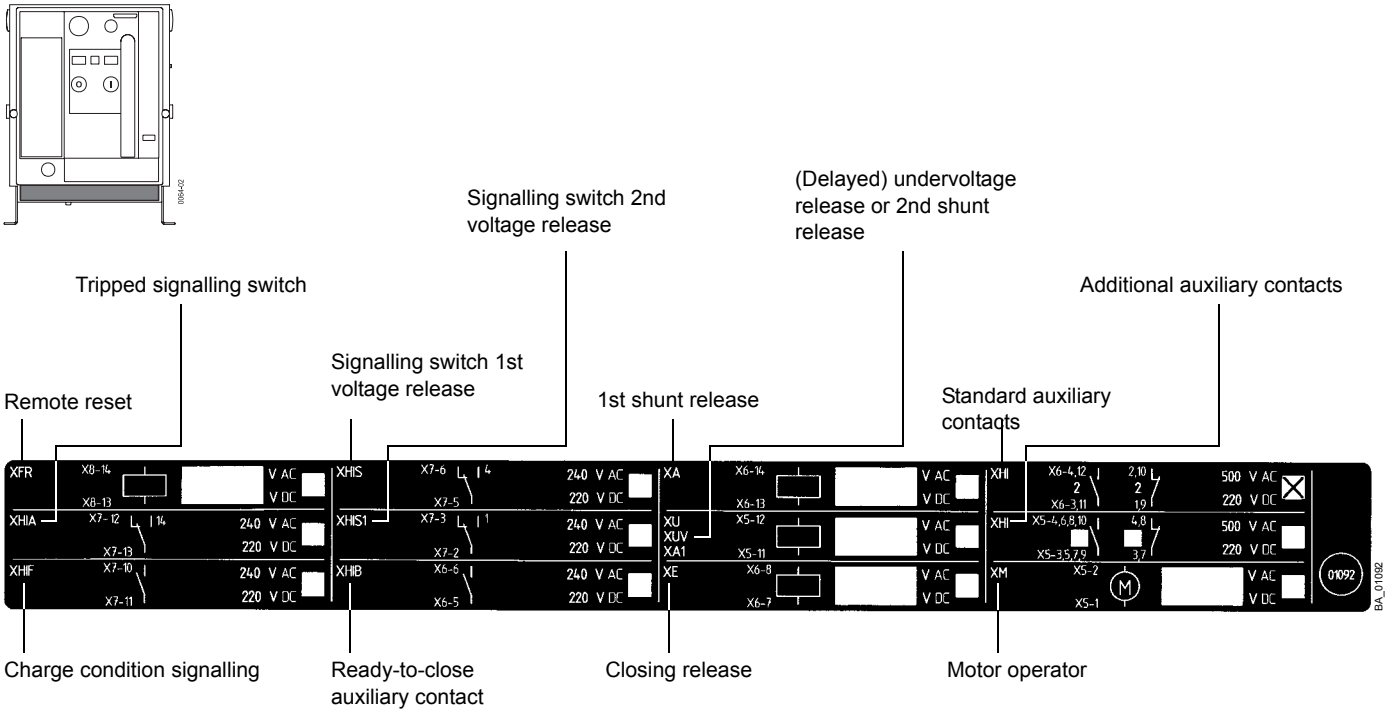
(15) Shutter actuator → page 19 – 2
(16) Position signalling switch (option) → page 19 – 9
(17) Auxiliary sliding contacts module (quantity depends on configuration) → page 5 – 17

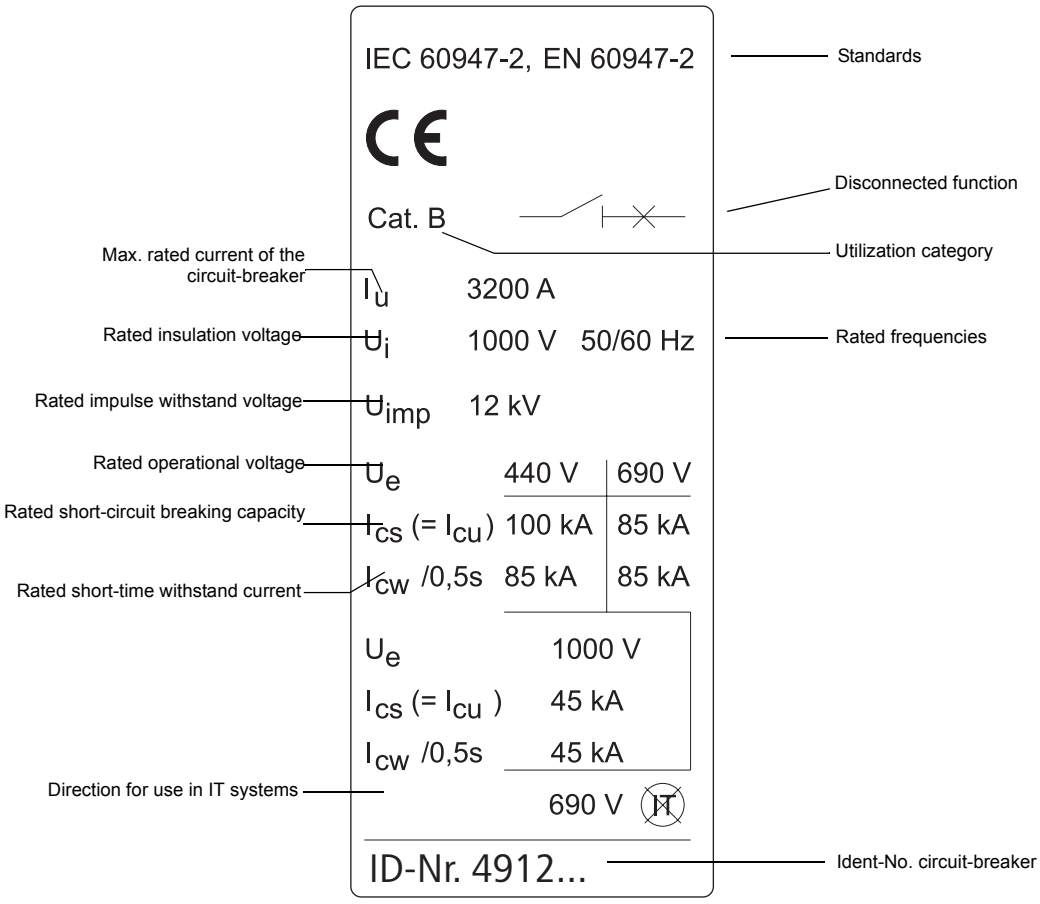
2 Labels

2.1 Circuit-breaker equipment label

(with terminal designations)

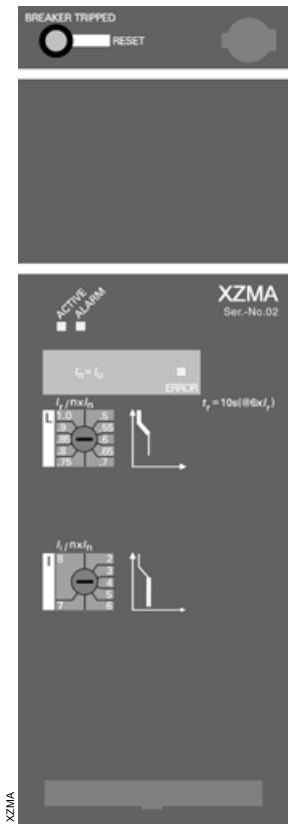


2.2 Circuit-breaker label



2.3 Identification of the control unit

IZM ...-A... Release for protection of systems

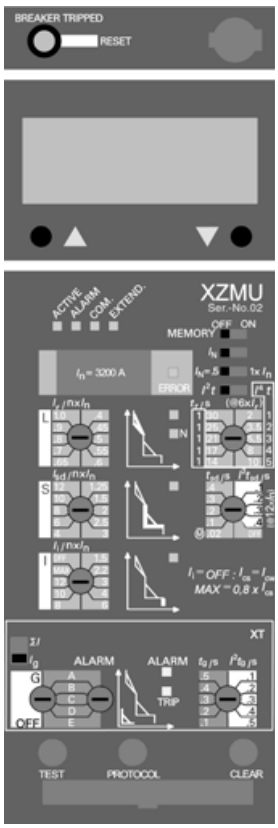


XZMA

IZM ...-U... Release for universal protection

Options:

XT(A)	Earth-fault protection N-conductor protection adjustable
XAM	LCD-display
XCOM-DP	Communication interface
XMP(H)	Measurement module

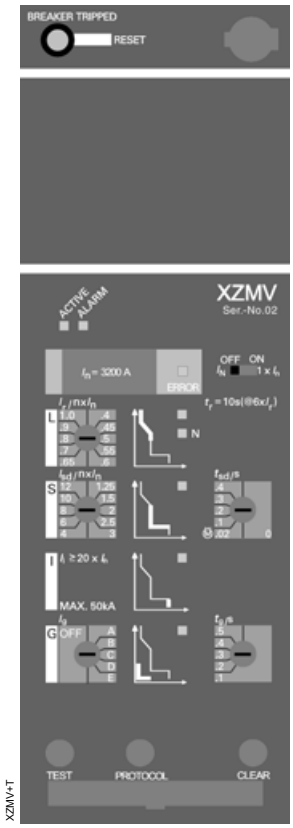


XZMU

IZM ...-V... Release for selectively-opening circuit-breakers

Options:

XT	Earth-fault protection Neutral conductor protection, can be switched on/off

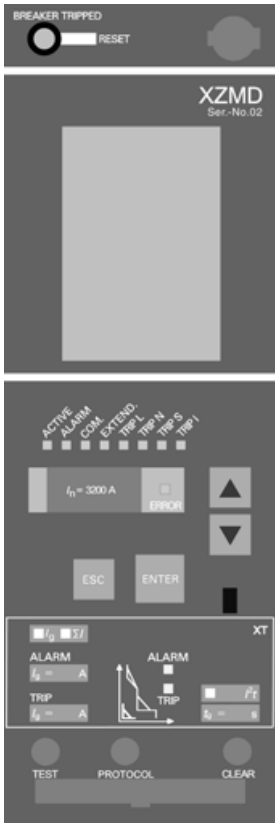


XZMV+T

IZM...-D... Digital overcurrent release

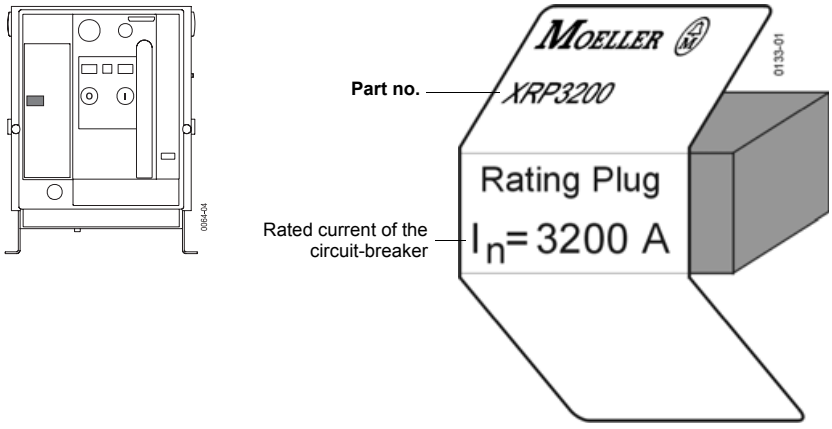
Options:

XT(A)	Earth-fault protection N-conductor protection adjustable
XCOM-DP	Communication interface
XMP(H)	Measurement module

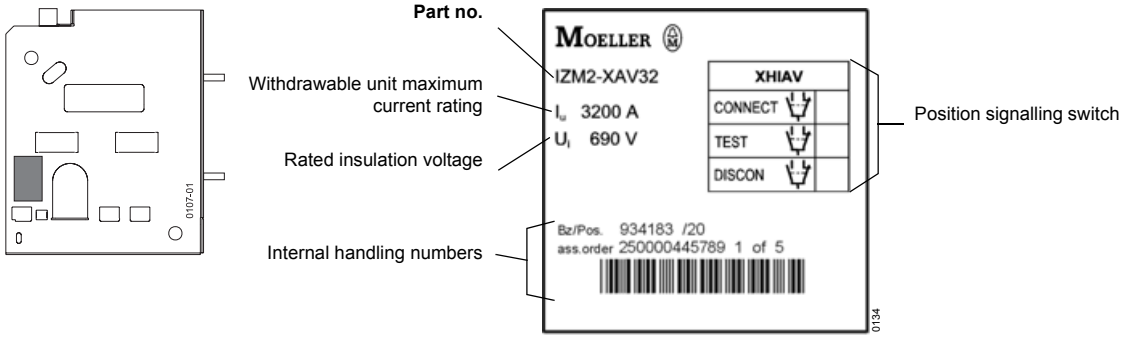


XZMD+AMG

2.4 Rating plug label



2.5 Withdrawable unit label



3 Standards and regulations

	Danger
 	**Dangerous voltage!** **Can cause death, serious injury or damage to material/property.** Only qualified personnel that are familiar with the warning and safety notices and maintenance instructions may work on the device. Qualified personnel must have the skill and experience in the operation of electrical equipment and systems as well as their construction and function. They should have taken part in safety training concerning the dangers of electrical equipment. The effective and safe function of these devices is dependant upon correct operation, installation, handling and maintenance.

Qualified Personnel

For the purpose of this instruction manual and product labels, a "qualified person" is one who is familiar with the installation, construction and operation of the equipment and the hazards involved. In addition, he has the following qualifications:

a) Training or instruction in respectively, authorisation, circuitry and device/systems in accordance with the regulations for safe on and off switching, earthing and identification.

b) Training or instruction in accordance with the regulations for the safety features in care and application of appropriate safety equipment.

c) Is trained in rendering first aid.

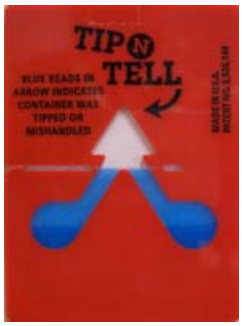
The circuit-breakers are suited for operation in enclosed spaces not subject to operating conditions aggravated by dust, caustic vapours or gases. Circuit-breakers to be installed in dusty or damp locations must be appropriately enclosed.

The circuit-breaker is in conformity with the standards:
IEC 60947-2
EN 60947-2

4 Transport

Unpack the circuit-breaker and inspect for damage. In case of later installation of the circuit-breaker or withdrawable unit: They may be stored and redispatched only in the original packing.

Transport packing

Red transport indicator	
	
Arrow in the top half is partly or fully blue.	Arrow in the top half is white
– Transport not according to instructions (switch was tilted or overturned) – Check circuit-breaker for transport damage – Notify damages to forwarding agent	– Circuit-breaker was not tilted or overturned during transport

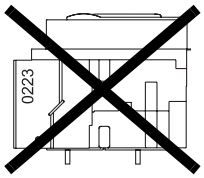
4.1 Overseas packing

Check humidity indicator		**Further storage**
Pink	Blue	Renew dessicant or seal tightly with dry plastic film Check packing regularly
Sealed packing ineffective. Check circuit-breaker for corrosion. Report damage to transport company	Good	

4.2 Unpacking

Unpack the circuit-breaker and inspect for damages.

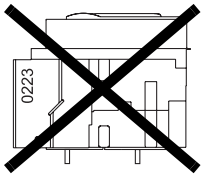
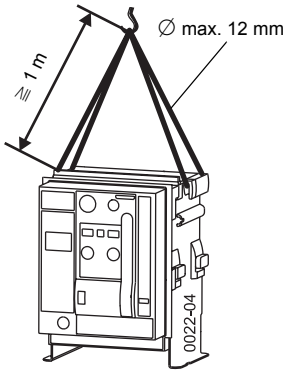
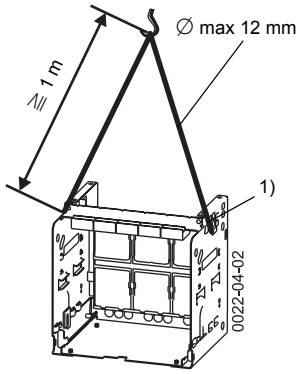
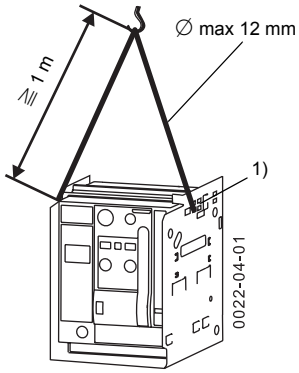
For later installation of circuit-breaker or withdrawable unit: Storage and further shipment only in original packing.



CAUTION
Do not lay the circuit-breaker on it´s back!

4.3 Lifting by crane

	Danger
	**Heavy device.** **Incorrect lifting can cause death or serious injury as well as damage to the device and equipment.** Never lift a circuit-breaker, or a withdrawable unit over a person. Follow the operating instructions of the crane. Only use OSHA/ NIOSH tested crane harnesses. Use personnel safety equipment to lift or move circuit-breakers and withdrawable unit.

Caution Do not put on the rear side! 	**Circuit-breaker**	**Withdrawable unit**	**Circuit-breaker + Withdrawable unit**
			
Frame size/No. of poles	**Weight**		
IZM(IN).1-... / 3	43 kg	25 kg	70 kg
IZM(IN).1-... / 4	50 kg	30 kg	84 kg
IZM(IN).2-... / 3	max. 64 kg	max. 45 kg	max. 113 kg
IZM(IN).2-... / 4	max. 77 kg	max. 54 kg	max. 136 kg
IZM(IN).3-... / 3	max. 90 kg	max. 70 kg	max. 166 kg
IZM(IN).3-... / 4	max. 108 kg	max. 119 kg	max. 227 kg

1) Hook cable above the label.

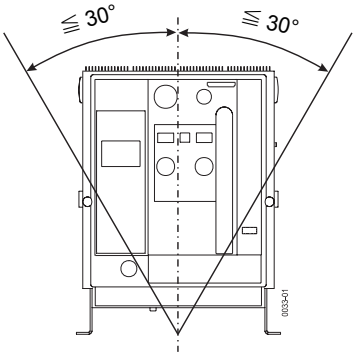
5 Mounting

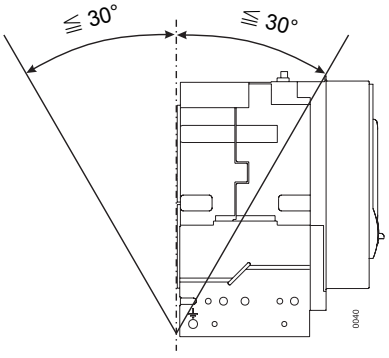
	WARNING
	Safe operation is dependent upon proper handling and installation by qualified personnel under observance of all warnings contained in this instruction manual. The general installation and safety regulations for working on high current systems (e.g. DIN VDE) and also standards concerning the correct use of lifting equipment and tools and the use of personal protection equipment (safety glasses, etc.) should be especially observed. Non-observance can result in death, severe personal injury or substantial property damage.

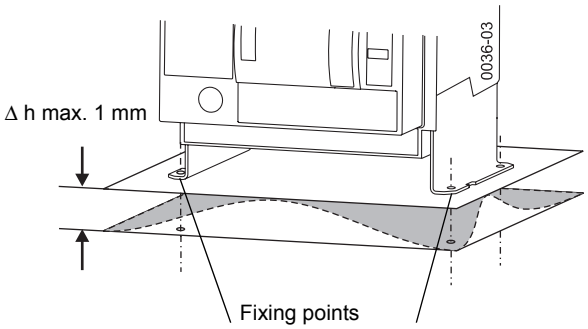
	Danger
	**Heavy device.** **Incorrect lifting can cause death or serious injury as well as damage to the device and equipment.** Never lift a circuit-breaker, or a withdrawable unit over a person. Follow the operating instructions of the crane. Only use OSHA/ NIOSH tested crane harnesses. Use personnel safety equipment to lift or move circuit-breakers and withdrawable unit.

5.1 Installation

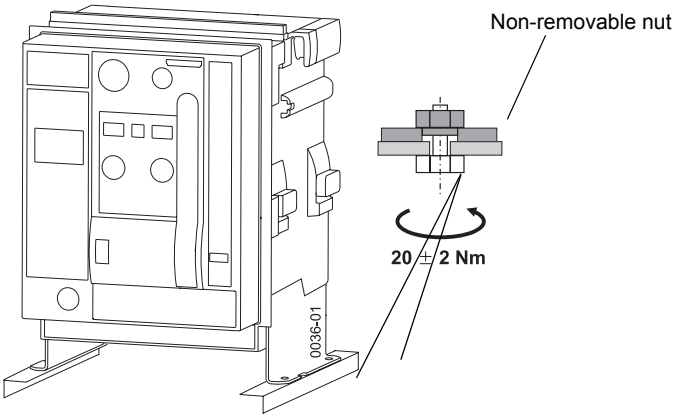
5.1.1 Mounting position



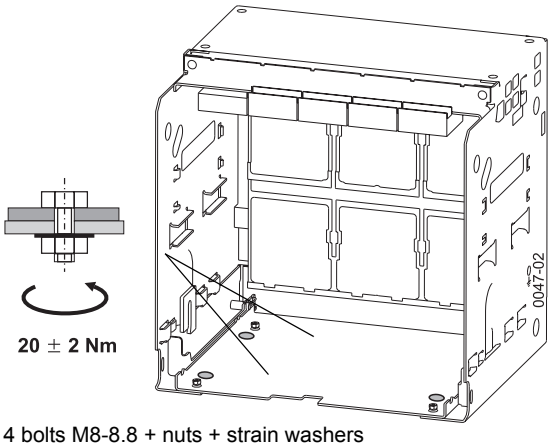




5.1.2 Mounting on horizontal surface



4 bolts M8-8.8



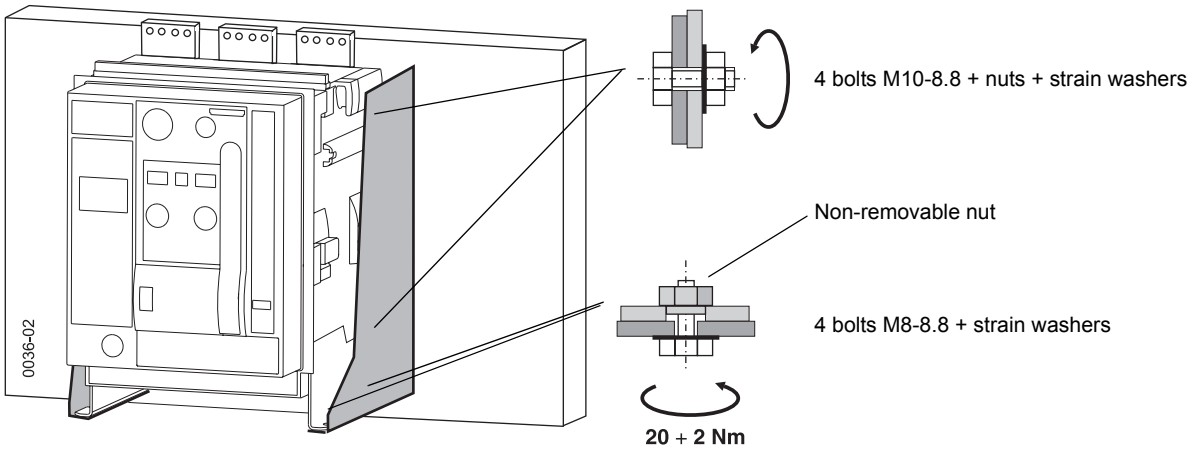
4 bolts M8-8.8 + nuts + strain washers

If several withdrawable units are arranged one above the other in cubicles **without** compartment bases we recommend the use of arc chute covers (→ page 21 – 1).

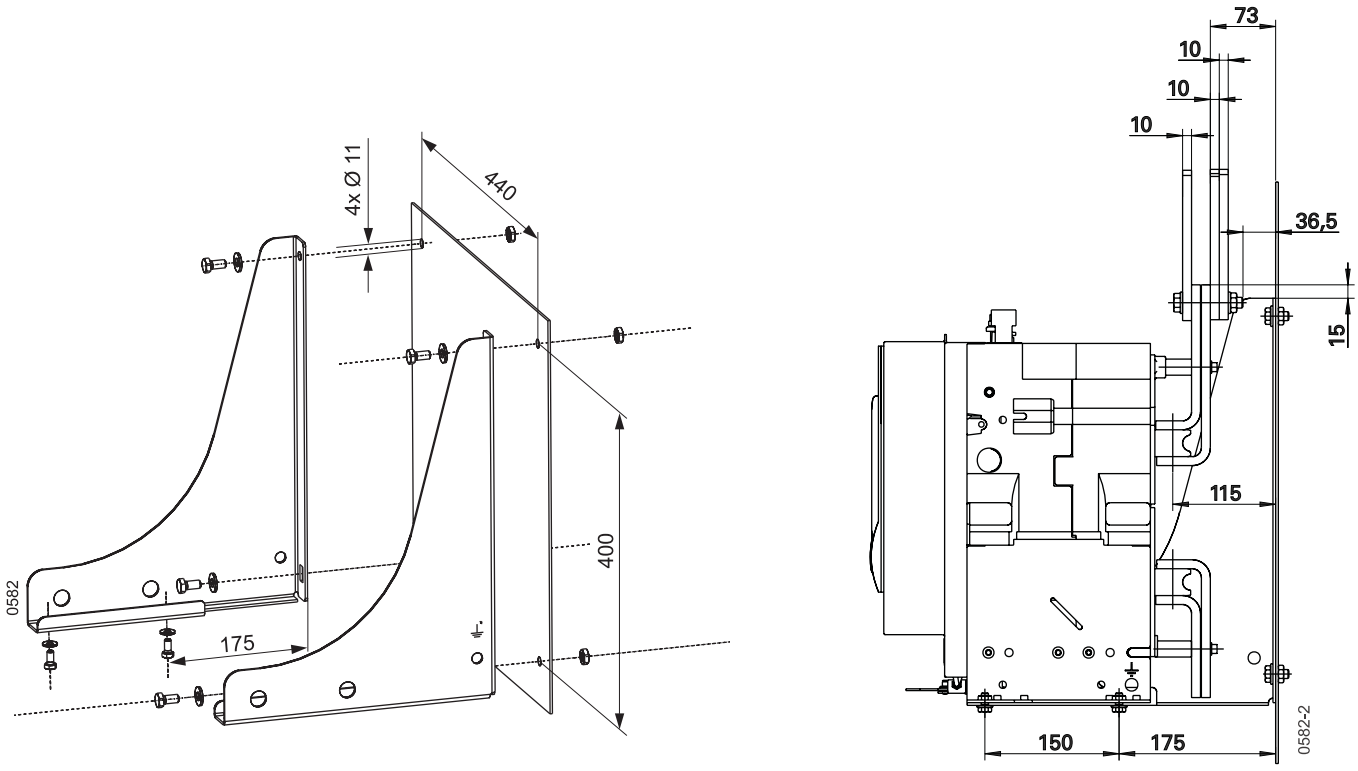
5.1.3 Mounting on a vertical surface with mounting brackets

For fixed-mounted circuit-breaker only.

	Part no.
Mounting brackets (only for IZM(IN).1-... and IZM(IN).2-...)	IZM1/2-XTW

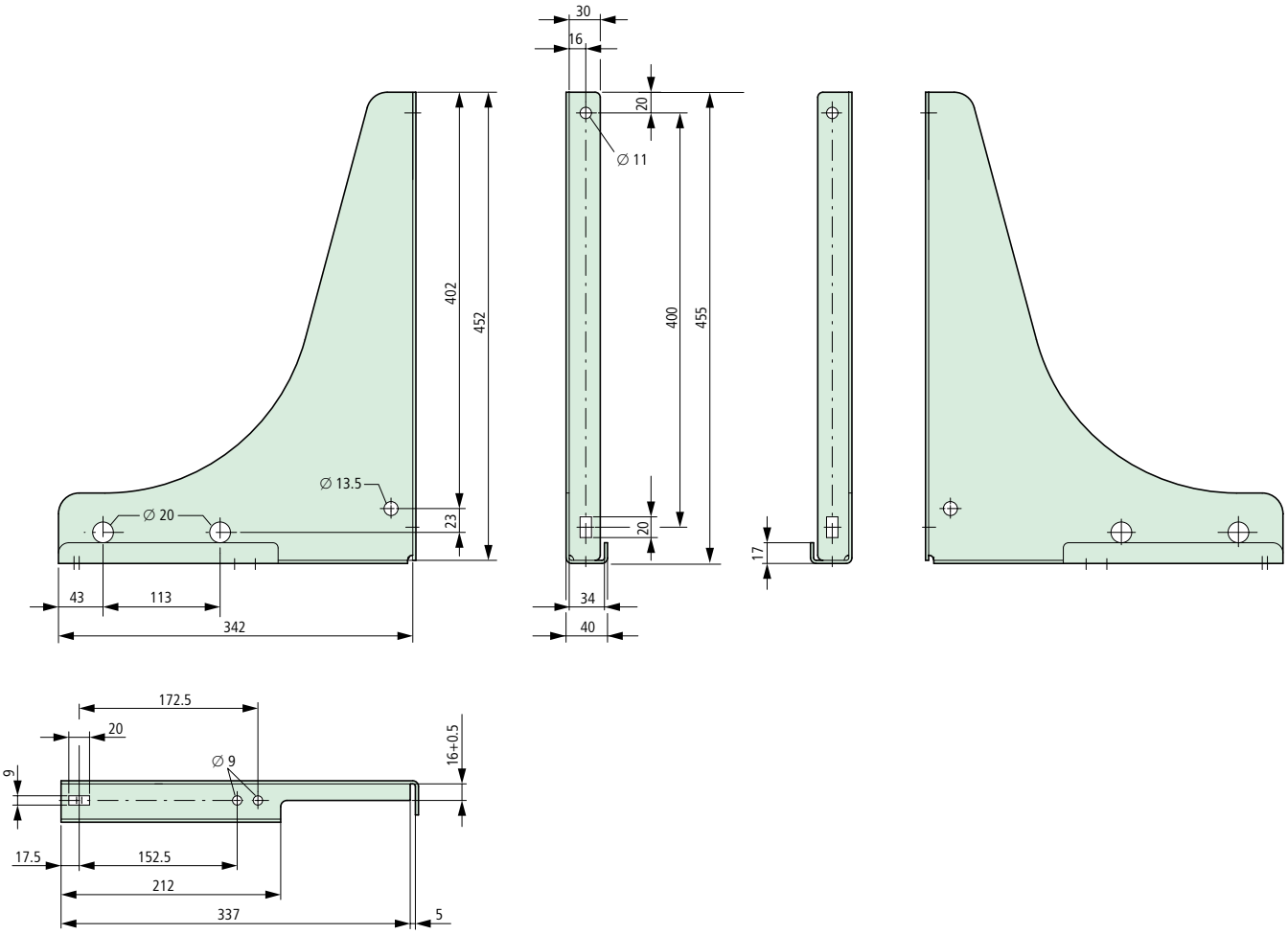


Mounting dimensions



Representation of IZM(IN).2-... with front connection.

Dimension diagram, mounting brackets



5.1.4 Safety clearances

5.1.5 Safety clearance to earthed parts

Rated operational voltage	above control circuit plug	Side (each)	Rear
[V AC]	[mm]	[mm]	[mm]
IZM(IN).1-..., Fixed mounting			
440	75[1)]	0	0
690	75[1)]	0	0
IZM(IN).1-..., Withdrawable, without arc chute cover			
440	50[1)]	0	0
690	50[1)]	0	0
IZM(IN).1-..., Withdrawable, with arc chute cover			
440	0	0[2)]	0
690	0	0[2)]	0
IZM(IN).2-..., Fixed mounting			
440	75[1)]	0	0
690	75[1)]	0	0
1000	180	0	0
IZM(IN).2-..., Withdrawable, without arc chute cover			
440	50[1)]	0	0
690	50[1)]	0	0
1000	100	0	0
IZM(IN).2-..., Withdrawable, with arc chute cover			
440	0	0[2)]	0
690	0	0[2)]	0
IZM(IN).3-..., Fixed mounting			
440	75[1)]	0	0
690	75[1)]	0	0
1000	180	0	0
IZM(IN).3-..., Withdrawable, without arc chute cover			
440	50[1)]	0	0
690	50[1)]	0	0
1000	100	0	0
IZM(IN).3-..., Withdrawable, with arc chute cover			
440	0	0[2)]	0
690	0	0[2)]	0

5.1.5.1 Safety clearances to live parts

Rated operational voltage	above control circuit plug	Side (each)	Rear
[V AC]	[mm]	[mm]	[mm]
IZM(IN).1-..., Fixed mounting			
440	150	20	20
690	300	50	125
IZM(IN).1-..., Withdrawable, without arc chute cover			
440	150	20	14
690	300	50	14
IZM(IN).1-..., Withdrawable, with arc chute cover			
440	14	100	14
690	14	100	14
IZM(IN).2-..., Fixed mounting			
440	250	50	20
690	600	100	140
1000	430	100	125
IZM(IN).2-..., Withdrawable, without arc chute cover			
440	250	50	14
690	600	100	30
1000	350	100	14
IZM(IN).2-..., Withdrawable, with arc chute cover			
440	14	50	14
690	14	225	14
IZM(IN).3-..., Fixed mounting			
440	75	20	20
690	500	100	125
1000	430	100	125
IZM(IN).3-..., Withdrawable, without arc chute cover			
440	50	20	14
690	500	100	14
1000	350	100	14
IZM(IN).3-..., Withdrawable, with arc chute cover			
440	14	50	14
690	14	200	14

1) Value for plates, 0 mm for supports and grills.

2) 40 mm (IZM(IN).2-...: 70 mm) for plates that cover openings in drawer frame.

All safety clearances above the circuit-breaker are from the top edge of the control circuit plug not the top edge of the arc chute!
→ dimension drawings

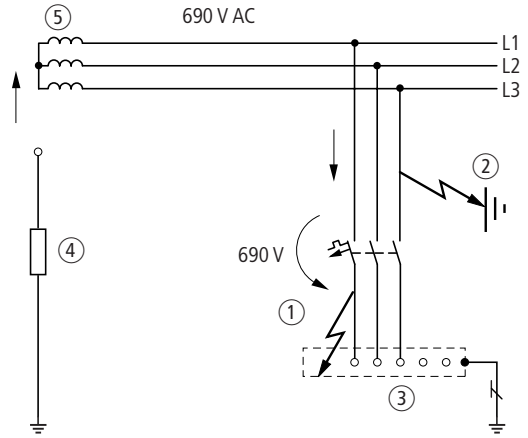
5.1.6 Use in IT systems

5.1.7 Regulations

In EN 60947-2 “Low voltage switchgear Part 2: circuit-breakers” for the use of circuit-breakers in an unearthed or impedance earthed network (IT systems) an extra test to IEC 60947-2 Appendix H is required.

Subsequently the tests with 1.2 times the highest setting of the short time delayed overcurrent trip (S trip) or the undelayed overcurrent trip (I trip) when no S trip is available, as single pole short-circuit switch-off capacity I_{IT} are to be verified. This is for a maximum of 50 kA. The tests are to carried out with the phase voltages of the highest rated operating voltage Ue for use in the network.

With this the worst case fault that could occur in the IT system is covered, with a double earth fault on the load and incoming sides See following illustration:



① Fault 1
② Fault 2
③ Frame
④ Impedance
⑤ Transformer

Explanation:

– After fault 1 fault 2 then occurs.

– With that there is then a double earth fault on the load and incoming sides.

– On the main contacts in phase L1 is then the full phase voltage of e.g. 690 V.

– At the same time the contact must carry a high short-circuit current.

5.1.7.1 Conditions for use in IT Systems

The IZM circuit-breaker fulfills the requirements for use in IT systems with the standard IEC 60947-2 Appendix H demanded maximum values with consideration of the following options and safety clearances (blow-out space).

The details for the blow-out space above the control circuit plug is based on the necessary blow-out space over the arc chute and serves as additional information to users who want to bring their safety clearances to the appropriate highest point of the device (control circuit plug). The short-circuit breaking capacity shown in the table I_{IT} corresponds to the maximum demanded value in the standard IEC 60947-2 Appendix H , to fulfill an acceptibility in the IT systems with the respective rated operating voltage U_e.

The circuit-breakers of type IZM1 cannot be used in 690 V IT systems, here the option IZM...-X1000 V is generally suitable.

Overview circuit-breaker IZM in IT systems to IEC 60947-2 or EN 60947-2 Appendix H				
Type (3/4-pole)		**IZM1**	**IZM2**	**IZM3**
Rated operating voltage Ue ≦ 440 V				
– Single pole short-circuit breaking capacity I_{IT}	kA	23	50	50
– neccessary options		–	–	–
– minimum required blow-out space above arc chute.	mm	100	100	50
– corresponding minimum blow-out space above control circuit plug. (fixed/withdrawable)	mm	70/40	70/40	20/0
– labelling to IEC 60947-2 Appendix H		690 V IT	690 V IT	500 V IT
Rated operating voltage Ue ≦ 500 V				
– Single pole short-circuit breaking capacity IIT	kA	23	50	50
– neccessary options		–	–	–X1000 V[1)]
– minimum required blow-out space above arc chute.	mm	150	150	50
– corresponding minimum blow-out space above control circuit plug. (fixed/withdrawable)	mm	120/90	120/90	65/0
– labelling to IEC 60947-2 Appendix H		690 V IT	690 V IT	1000 V IT
Rated operating voltage Ue ≦ 690 V				
– Single pole short-circuit breaking capacity IIT	kA	–	50	50
– neccessary options		–	–X1000 V [2)]	–X1000 V [1)]
– minimum required blow-out space above arc chute.	mm	–	50	50
– corresponding minimum blow-out space above control circuit plug. (fixed/withdrawable)	mm	–	65/0	65/0
– labelling to IEC 60947-2 Appendix H		690 V IT	1000 V IT	1000 V IT

1) –X1000 V ist option IZM...-X1000 V for rated operating voltage Ue = 1000 V AC

2) Exception: IZM...2-(4-)A(V)800...1600, this circuit-breaker fulfills the requirement for 690V IT networks corresonding to IEC 60947-2, Appendix H (contrary to the details on the rating label: IT)

5.1.8 Labelling of the IZM circuit-breaker

The standard IEC 60947-2 Appendix H demands the labelling of devices that are in their existing features not suitable for IT networks for all values of the rated operating voltage and the corresponding types or sizes. The following symbol must be directly behind the rated operating voltage e.g. 690 V .IT

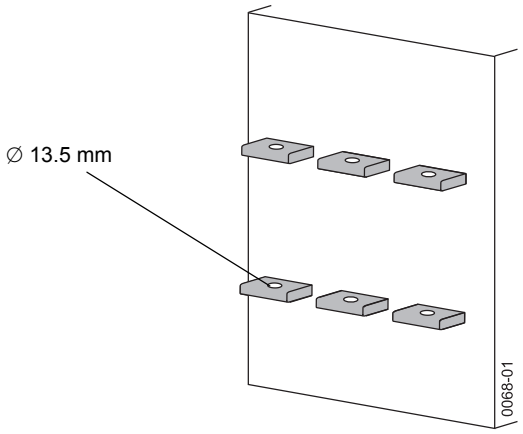
The labelling for single sizes and voltages can be seen in the above table.

5.2 Connecting bars

→ Frame sizes, dimension drawings (page 7 – 1)

5.2.1 Horizontal connection

The horizontal connection is up to 5000 A including the standard connection for fixed-mounted circuit-breakers and withdrawable unit.

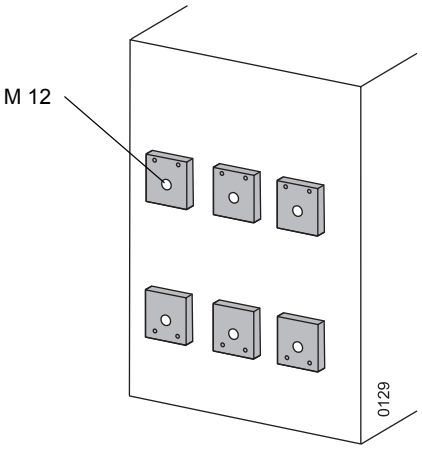


For withdrawable unit only:

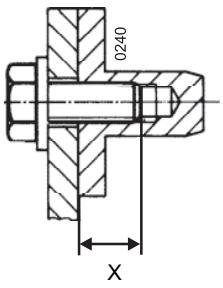
→ Retrofit installation of horizontal connections (page 5 – 12)

5.2.2 Flange connection

(only for withdrawable)



The mounting of the flange connection is similar to the mounting of the vertcal and horizontal connections (→ page 5 – 12)



70 ±4 Nm

Screw-in depth:

x = 18...24 mm

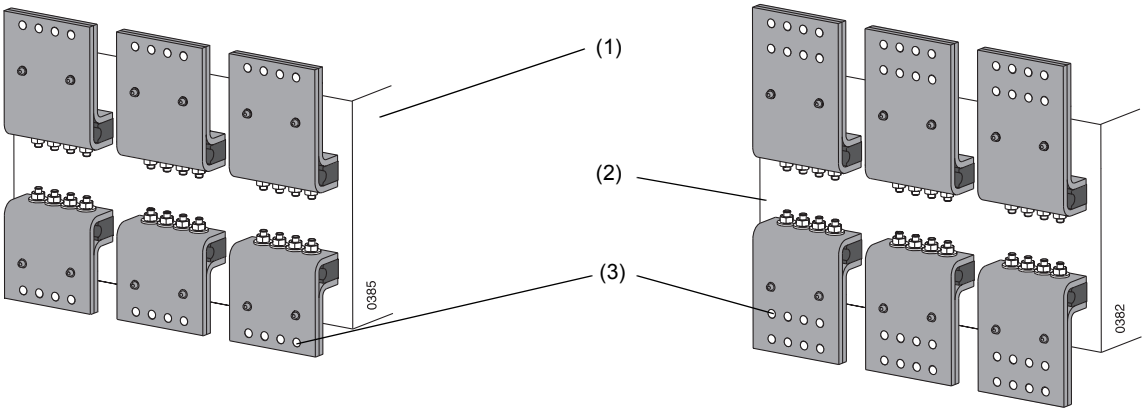
5.2.3 Front connection

Note

When front connections are used, a partition between busbar and arcing space must be fitted on the system side.

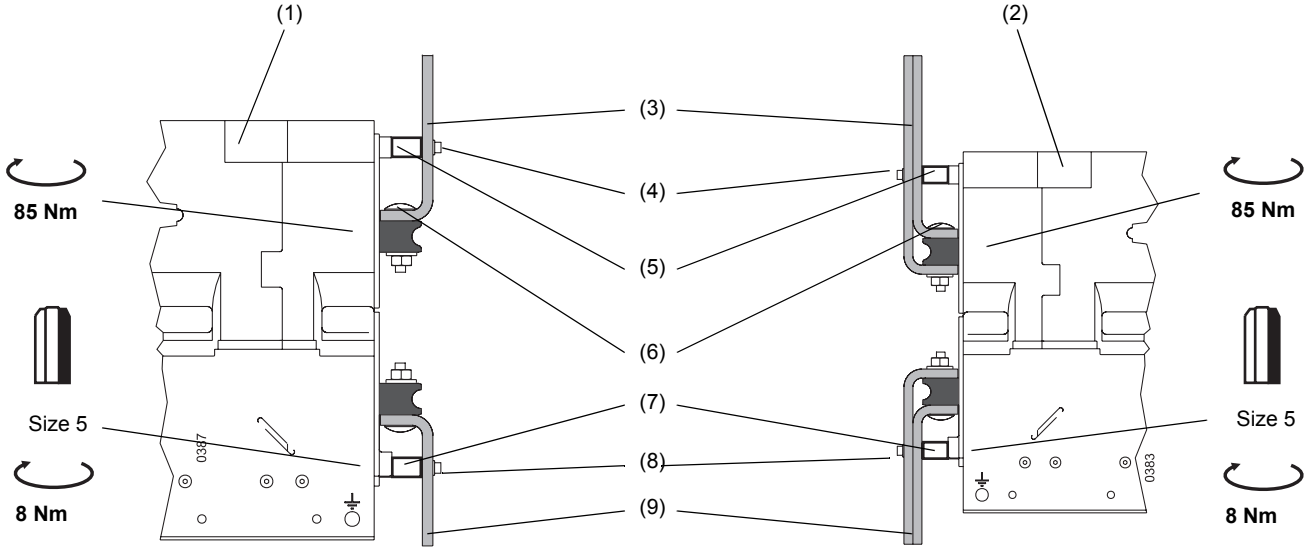
Fixed-mounted circuit-breaker

Two variations are offered:



(1) Standard version: single-hole fitting
(2) Version double-hole fitting
(3) Holes ∅ 13.5

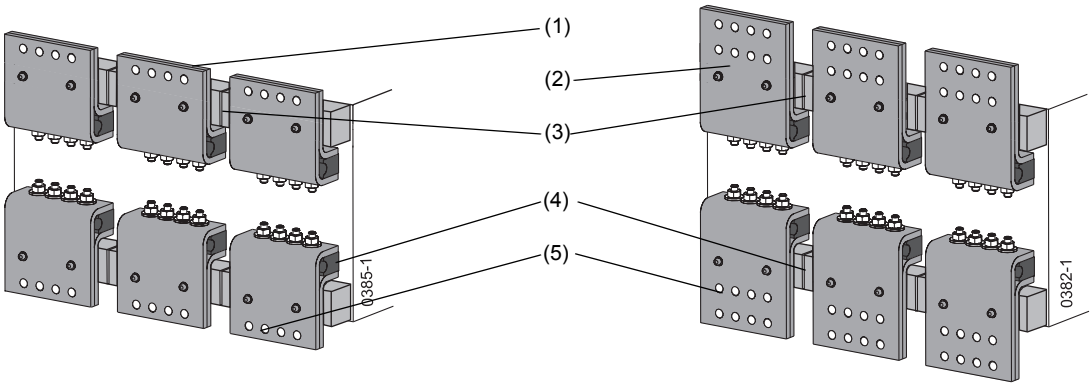
Fastening connecting bars:



(1) For
IZM(IN).1-... ≦ 1000 A and
IZM(IN).2-... ≦ 2000 A
(2) For
IZM(IN).1-... 1600 A
IZM(IN).2-... 2500 A, 3200 A
IZM(IN).3-... 4000 A
(3) Long connecting bar
(4) Short hexagon socket screw ISO 4762 M6 with strain washer
(5) Short spacer
(6) Coach screw DIN 603 M12 with strain washer and nut
(7) Long distance sleeve
(8) Long hexagon socket screw ISO 4762 M6 with strain washer
(9) Short connecting bar

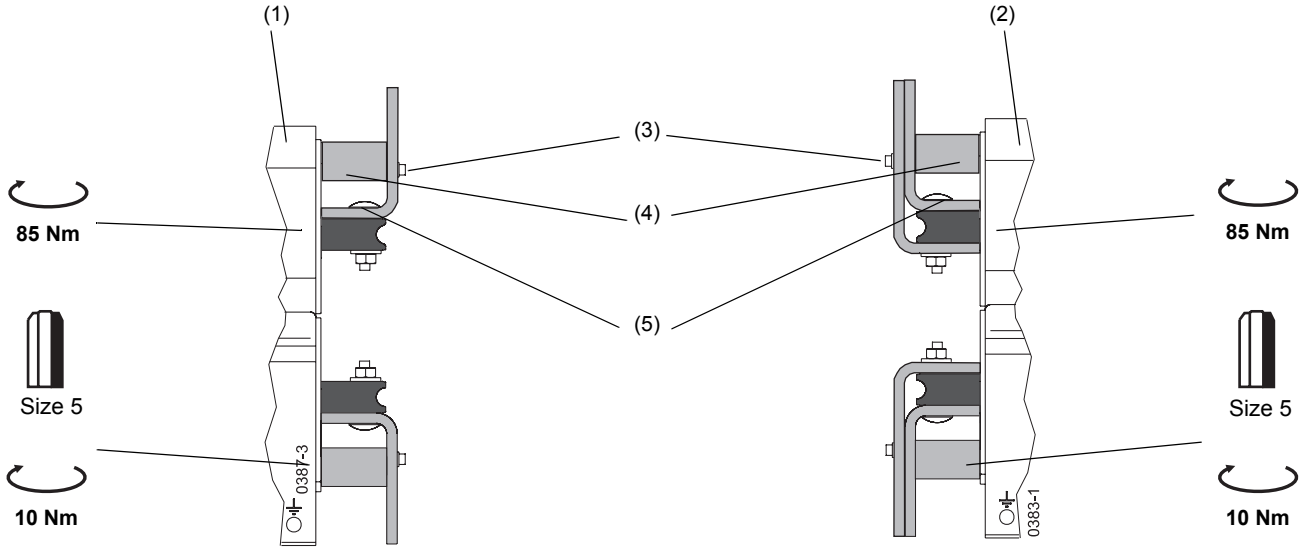
Withdrawable unit

Two variations are offered:



(1) Standard version: single-hole fitting
(2) Version double-hole fitting
(3) Slots for phase separation walls; mounting position as shown!
(4) Support
(5) Holes ∅ 13.5

Fastening connecting bars:



(1) For
IZM(IN).1-... ≦ 1000 A and
IZM(IN).2-... ≦ 2000 A
(2) For
IZM(IN).1-... 1600 A
IZM(IN).2-... 2500 A, 3200 A
IZM(IN).3-... 4000 A
(3) Hexagon socket screw ISO 4762 M6 with strain washer
(4) Support; mounting position as shown!
(5) Coach screw DIN 603 M12 with strain washer and nut

Conversion from vertical or flange connection to front connection requires installation of horizontal connection first!

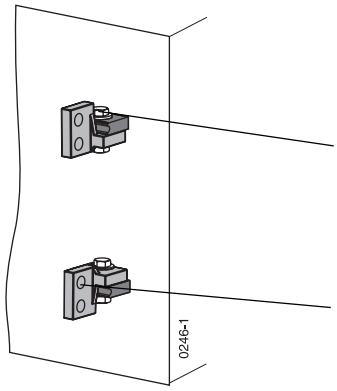
→ (page 5 – 11)

5.2.4 Vertical connection

Fixed-mounted circuit-breaker

Size	Rated current
IZM(IN).1-...	1000 A 1600 A[1)]

1) 2 connection bars per main connection, above and below fixing by offset slot,
→ Picture for IZM(IN).2-...



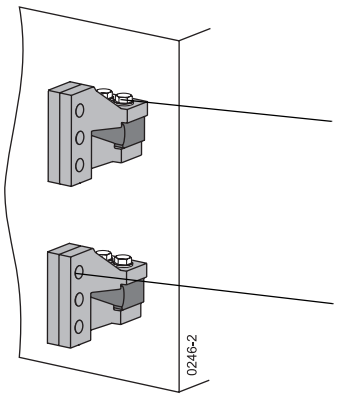
1 × M12-8.8 + nut
+ spring washer (above + below)

2 × ∅ 13.5 mm

85 Nm

Size	Rated current
IZM(IN).2-...	**2500** A**1)** 3200 **A**

1) 1 connect bar per main connection, middle fixing,
→ Picture for IZM(IN).1-...

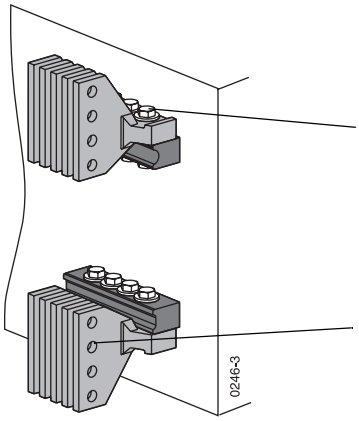


3 × M12-8.8 + nut
+ spring washer (above + below)

3 × ∅ 13.5 mm

85 Nm

Size	Rated current
IZM(IN).3-...	5000 **A**

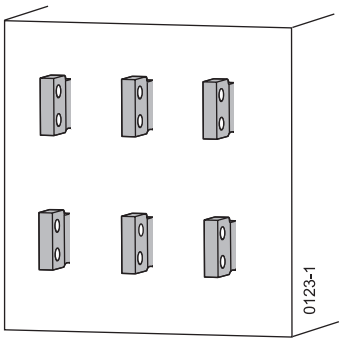


4 × M12-8.8 + nut
+ spring washer (above + below)

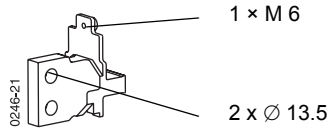
4 × ∅ 13.5 mm

85 Nm

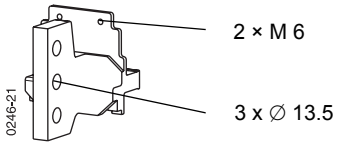
Withdrawable unit



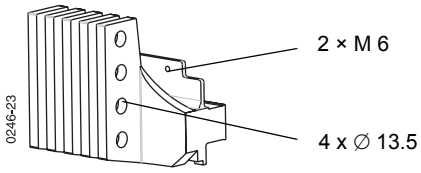
Size	Rated current
IZM(IN).1-...	1000 A, 1600 A



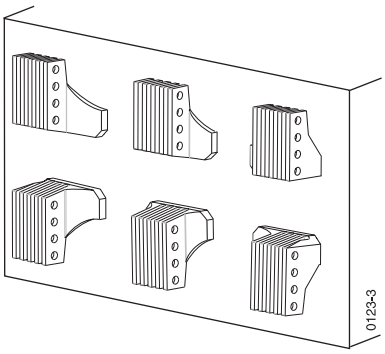
Size	Rated current
IZM(IN).2-...	2000 A, 2500 A 3200 **A**



Size	Rated current
IZM(IN).3-...	5000 **A**



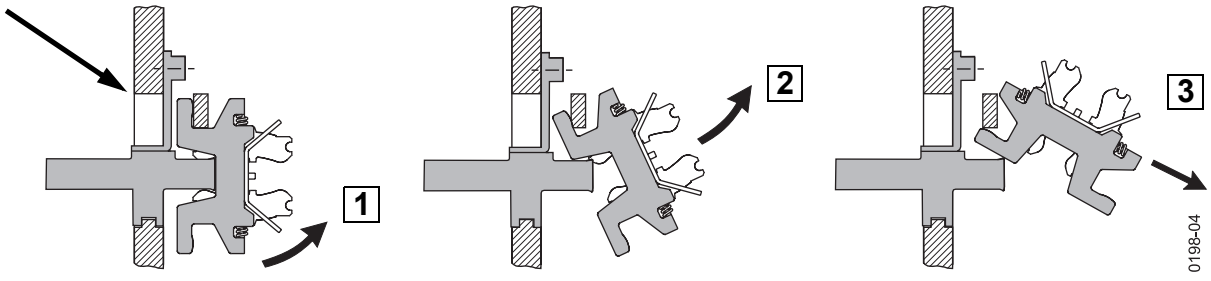
Size	Rated current
IZM(IN).3-...	6300 **A**



Vertical connections left and right asymmetric

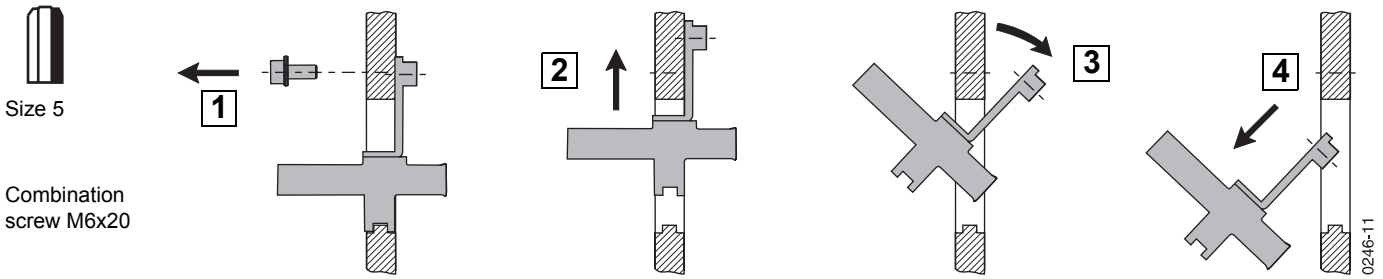
Removal of lamelle contacts

Rear side of withdrawable unit



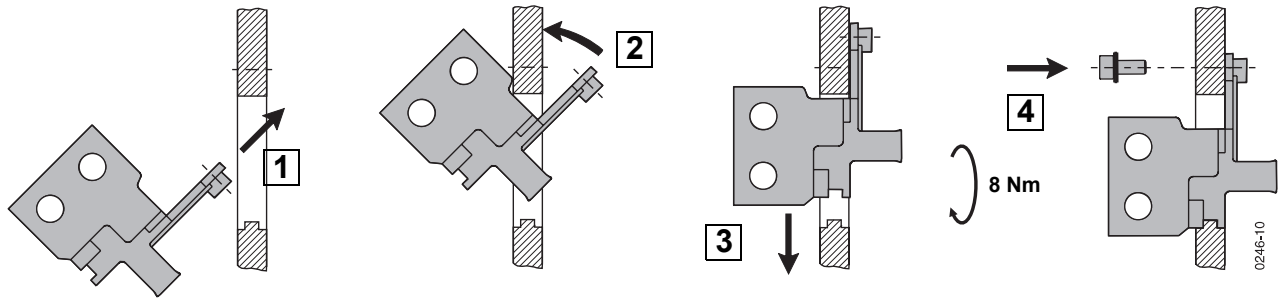
Removing horizontal connection

Rear drawer area



Installing vertical connection

Rear drawer area



Mounting steps for installation of horizontal or flange connection are similar.

Note

The lamelle blocks for circuit-breaker IZM(IN).3-..., 4000 A, are not fully equiped with lamelle.

ATTENTION
Only use similarly equiped lamelle blocks for assembly.

Order numbers

Connecting bars fixed-mounted circuit-breaker	Frame size	Rated current I_u	Part no.
Front connection (single-hole fitting) top	IZM(IN).1-...	≦ 1000 A	(+)IZM1-XAT1F10-0
		1250 A...1600 A	(+)IZM1-XAT1F16-0
	IZM(IN).2-...	≦ 2000 A	(+)IZM2-XAT1F20-0
		2500 A	(+)IZM2-XAT1F25-0
		3200 A	(+)IZM2-XAT1F32-0
	IZM(IN).3-...	≦ 4000 A	(+)IZM3-XAT1F40-0
Front connection (double-hole fitting) top	IZM(IN).1-...	≦ 1000 A	(+)IZM1-XATF10-0
		1250 A...1600 A	(+)IZM1-XATF16-0
	IZM(IN).2-...	≦ 2000 A	(+)IZM2-XATF20-0
		2500 A	(+)IZM2-XATF25-0
		3200 A	(+)IZM2-XATF32-0
	IZM(IN).3-...	≦ 4000 A	(+)IZM3-XATF40-0
Front connection (single-hole fitting) bottom	IZM(IN).1-...	≦ 1000 A	(+)IZM1-XAT1F10-U
		1250 A...1600 A	(+)IZM1-XAT1F16-U
	IZM(IN).2-...	≦ 2000 A	(+)IZM2-XAT1F20-U
		2500 A	(+)IZM2-XAT1F25-U
		3200 A	(+)IZM2-XAT1F32-U
	IZM(IN).3-...	≦ 4000 A	(+)IZM3-XAT1F40-U
Front connection (double-hole fitting) bottom	IZM(IN).1-...	≦ 1000 A	(+)IZM1-XATF10-U
		1250 A...1600 A	(+)IZM1-XATF16-U
	IZM(IN).2-...	≦ 2000 A	(+)IZM2-XATF20-U
		2500 A	(+)IZM2-XATF25-U
		3200 A	(+)IZM2-XATF32-U
	IZM(IN).3-...	≦ 4000 A	(+)IZM3-XATF40-U
Vertical connection	IZM(IN).1-...	≦ 1000 A	(+)IZM1-XATV10
		1600 A	(+)IZM1-XATV16[1)]
	IZM(IN).2-...	≦ 2500 A	(+)IZM2-XATV25
		3200 A	(+)IZM2-XATV32[2)]
	IZM(IN).3-...	≦ 5000 A	(+)IZM3-XATV50

1)IZM1-XATV16 = 2x IZM1-XATV10

2)IZM2-XATV32 = 2x IZM2-XATV25

Connecting bars withdrawable unit		Frame size	Rated current I_u	Part no.
Front connection (single-hole fitting) When these connections are ordered individually, additional supports must also be ordered.		IZM(IN).1-...	≦ 1000 A	(+)IZM1-XAT1F10-AV
			1250 A...1600 A	(+)IZM1-XAT1F16-AV
		IZM(IN).2-...	≦ 2000 A	(+)IZM2-XAT1F20-AV
			2500 A	(+)IZM2-XAT1F25-AV
			3200 A	(+)IZM2-XAT1F32-AV
		IZM(IN).3-...	≦ 4000 A	(+)IZM3-XAT1F40-AV
Front connection (double-hole fitting) When these connections are ordered individually, additional supports must also be ordered.		IZM(IN).1-...	≦ 1000 A	(+)IZM1-XATF10-AV
			1250 A...1600 A	(+)IZM1-XATF16-AV
		IZM(IN).2-...	≦ 2000 A	(+)IZM2-XATF20-AV
			2500 A	(+)IZM2-XATF25-AV
			3200 A	(+)IZM2-XATF32-AV
		IZM(IN).3-...	≦ 4000 A	(+)IZM3-XATF40-AV
Supports for front connections with withdrawable unit 2 supports per switch required	3-pole for 3 front connections	IZM(IN).1-...	≦ 1600 A	IZM1-XATFS
		IZM(IN).2-...	≦ 3200 A	IZM2-XATFS
		IZM(IN).3-...	≦ 4000 A	IZM3-XATFS
	4-pole for 4 front connections	IZM(IN).1-4-...	≦ 1600 A	IZM1-XATFS4
		IZM(IN).2-4-...	≦ 3200 A	IZM2-XATFS4
		IZM(IN).3-4-...	≦ 4000 A	IZM3-XATFS4
Vertical connection		IZM(IN).1-...	≦ 1000 A	(+)IZM1-XATV10-AV
			1250 A...1600 A	(+)IZM1-XATV16-AV
		IZM(IN).2-...	≦ 2000 A	(+)IZM2-XATV20-AV
			2500 A	(+)IZM2-XATV25-AV
			3200 A	(+)IZM2-XATV32-AV
		IZM(IN).3-...	≦ 5000 A	(+)IZM3-XATV50-AV
Flange connection		IZM(IN).1-...	≦ 1000 A	(+)IZM1-XATA10-AV
			1250 A...1600 A	(+)IZM1-XATA16-AV
		IZM(IN).2-...	≦ 2000 A	(+)IZM2-XATA20-AV
			≦ 2500 A	(+)IZM2-XATA25-AV
			≦ 3200 A	(+)IZM2-XATA32-AV
		IZM(IN).3-...	≦ 4000 A	(+)IZM3-XATA40-AV

5.3 Connection of main conductors

Main conductor - minimum cross section:

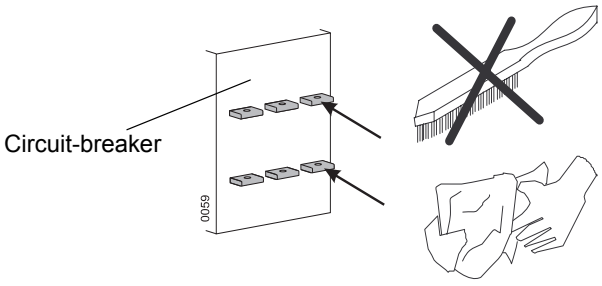
Frame size	Rated current I_u	Cross section Cu bars	
		bare/bare	black/bare
	[A]	[mm2][1)]	[mm2][1)]
IZM(IN).1-...	630	1 × 40 × 10	1 × 40 × 10
	800	1 × 50 × 10	1 × 60 × 10
	1000	1 × 60 × 10	1 × 60 × 10
	1250	2 × 40 × 10	2 × 40 × 10
	1600	2 × 50 × 10	2 × 50 × 10
IZM(IN).2-...	800	1 × 50 × 10	1 × 50 × 10
	1000	1 × 60 × 10	1 × 60 × 10
	1250	2 × 40 × 10	2 × 40 × 10
	1600	2 × 50 × 10	2 × 50 × 10
	2000	3 × 50 × 10	3 × 50 × 10
	2500	2 × 100 × 10	2 × 100 × 10
	3200	3 × 100 × 10	3 × 100 × 10
IZM(IN).3-...	4000	4 × 100 × 10	4 × 100 × 10
	5000	5 × 100 × 10	5 × 120 × 10
	6300	6 × 120 × 10	6 × 120 × 10

1) Other Cu bar sizes possible, but the total Cu cross section must not be less.

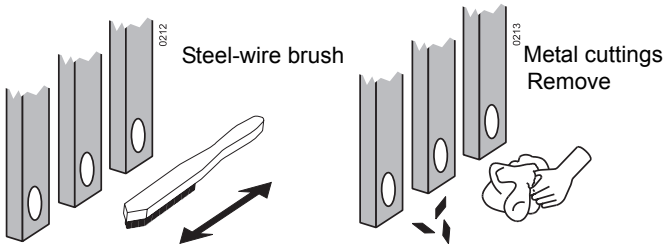
ATTENTION

On 4-pole circuit-breakers, the neutral conductor must always be connected all on the left (front view).
Otherwise this can cause malfunctions of the electronic overcurrent release.
Connection of cables directly on the circuit-breaker connections is not permissible.

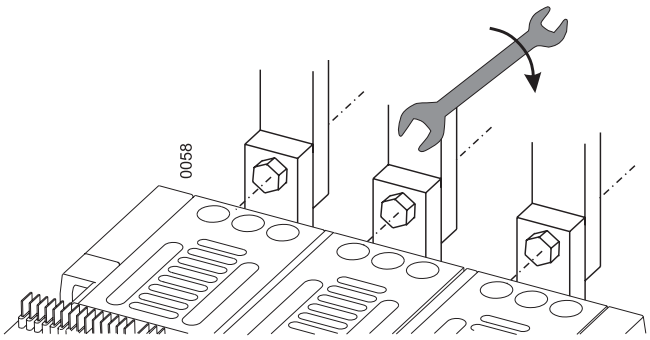
Cleaning the main conductor connection



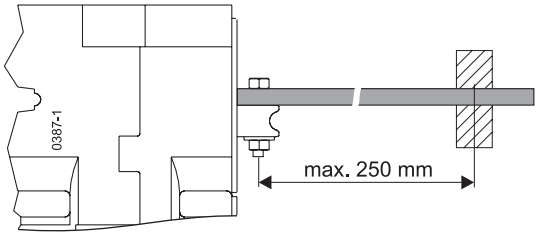
Cleaning the copper bars

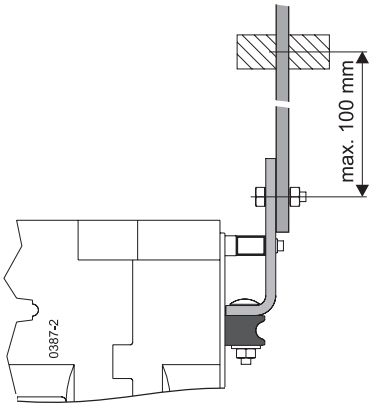


Bolt tight line-side bars



Bracing the main conductors



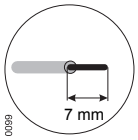
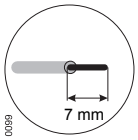


5.4 Auxiliary conductor connection

Terminal assignment:

→ Circuit diagrams (page 8 – 1)

Cross section connection type

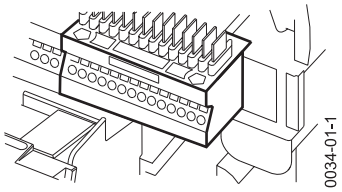
Strip conductors	1 x 	2 x 
Screw terminals 	0.5 – 2.5 mm² AWG 20...14 + Wire end ferrule[1)]	0.5 – 1.5 mm² AWG 20...15 + Wire end ferrule[1)]
Spring-loaded terminals 	0.5 – 2.5 mm² AWG 20...14 + Wire end ferrule[2)]	0.5 – 2.5 mm² AWG 20...14 + Wire end ferrule[2)]

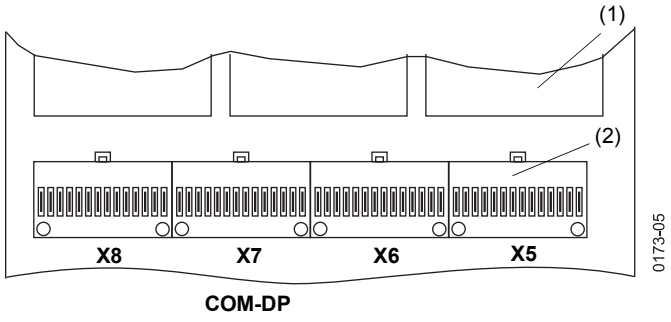
1) 1 × up to 2.5 mm² tubular without plastic sheath to DIN 46228-1
1 × up to 1.5 mm² tubular **with** plastic sheath to DIN 46228-2
2 × up to 1.5 mm² tubular **with** plastic sheath, twin ferrules

2) 2 × up to 2.5 mm² tubular without plastic sheath to DIN 46228-1
2 × up to 1.5 mm² tubular **with** plastic sheath to DIN 46228-2

5.4.1 Plug connector

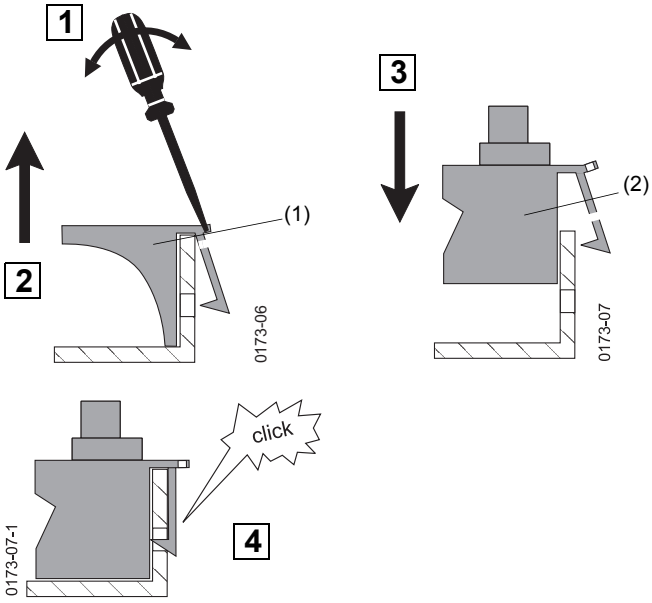
Arrangement





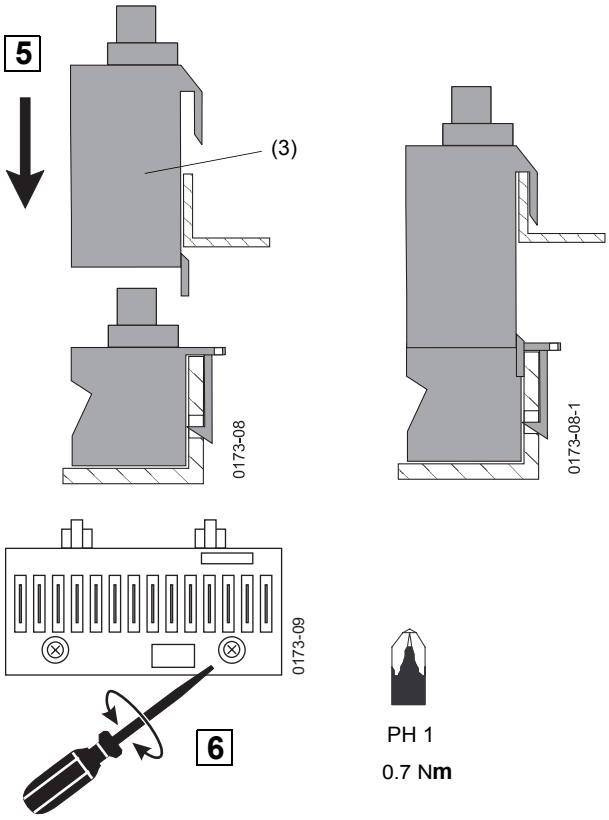
(1) Arc chute
(2) Plug connector

Retrofitting



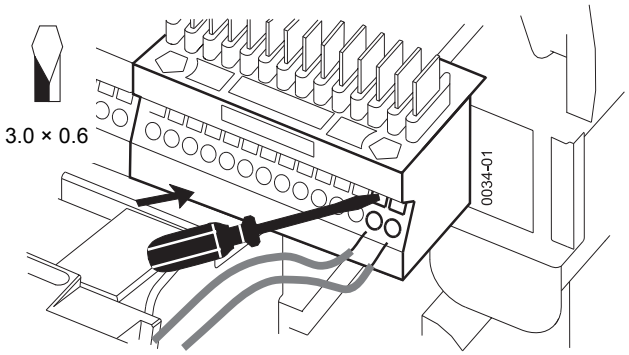
(1) Blanking cover
(2) Plug connector

Only for circuit-breakers, 1000 V version



(3) Knife-contact rail adapter for higher arc chute

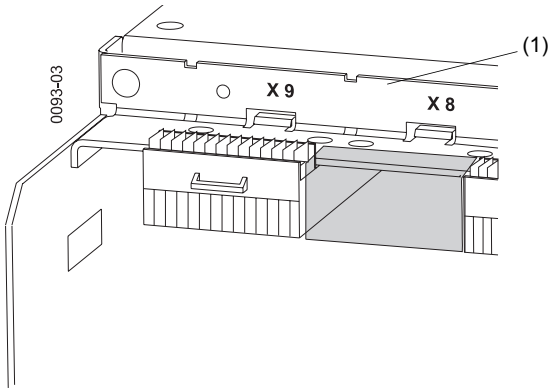
Spring-loaded terminals

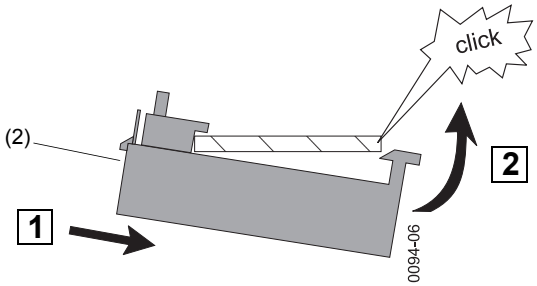


Connecting wires

5.4.2 Sliding contact module

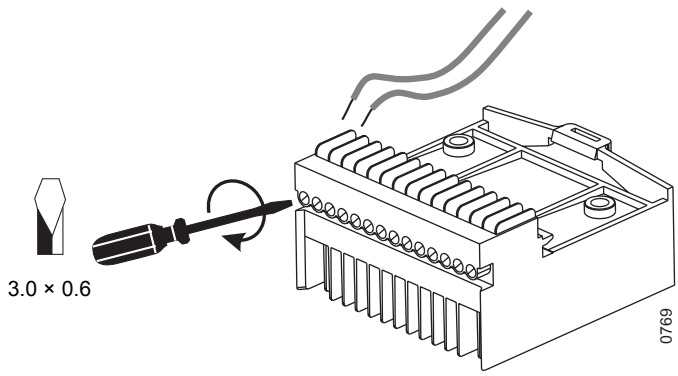
Retrofitting





(1) Connection area with sliding contact modules
(2) Sliding contact module

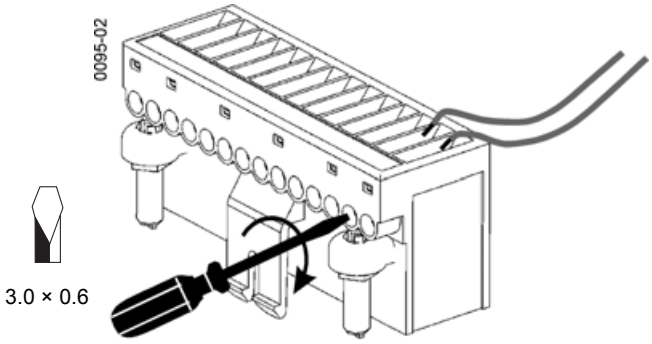
A single piece sliding contact module is also available with standard screw terminals.



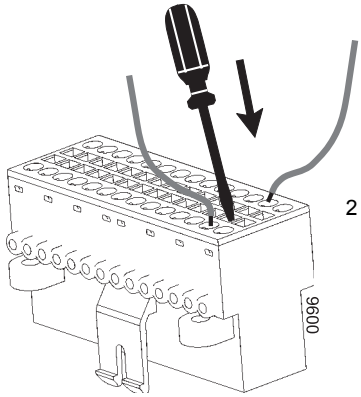
Single-piece sliding contact modules don´t require a control circuit plug. The cable is directly connected to the sliding contact module.

5.4.3 Control circuit plug

Screw terminals



Spring-loaded terminals

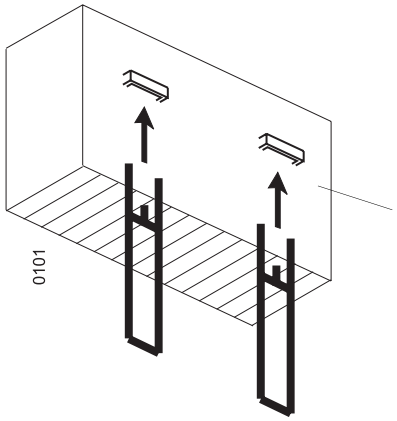


3.0 × 0.6

2 terminals in parallel per contact

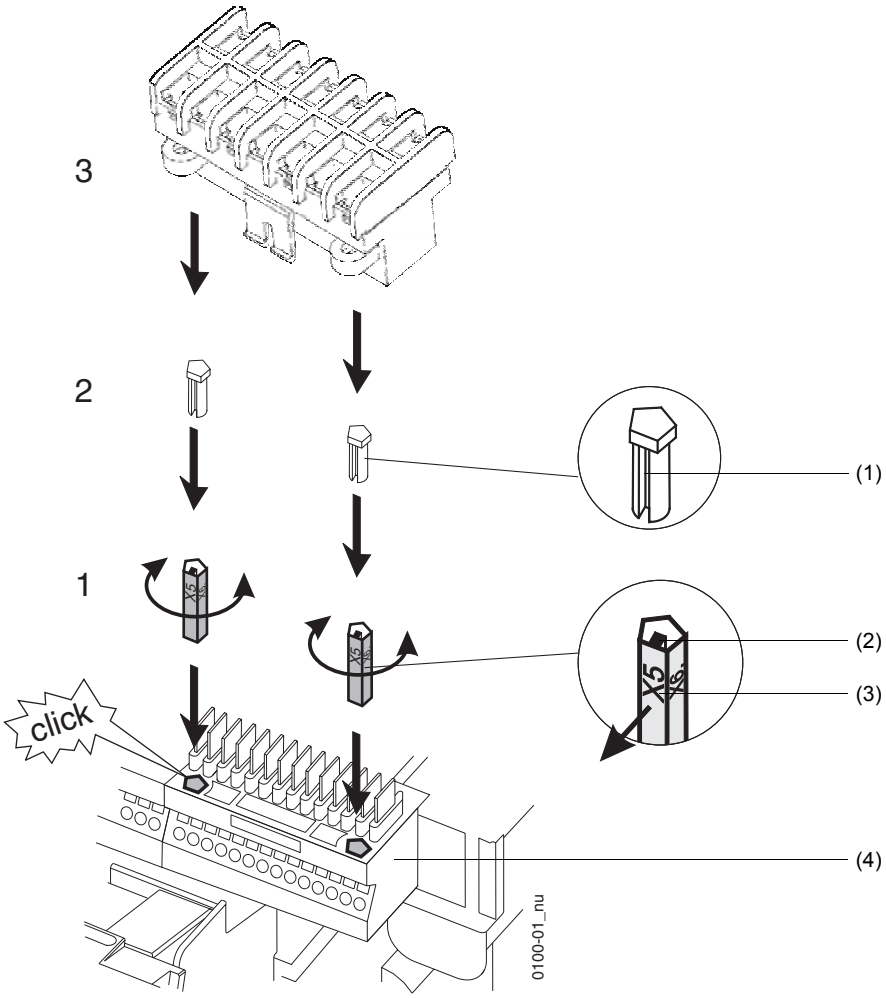
Attach guide tongues

(fixed-mounted circuit-breaker only)



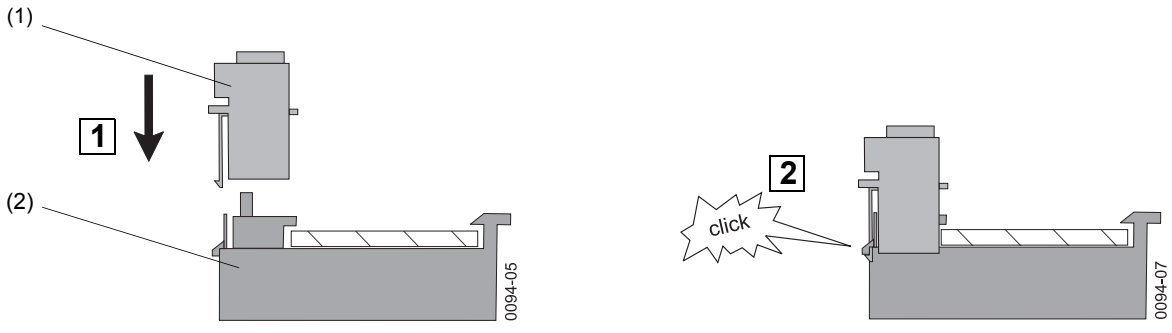
Back side of auxiliary connector

Coding (only fixed-mounted circuit-breakers)



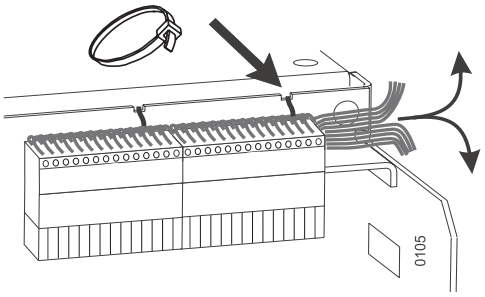
(1) Groove
(2) Guide
(3) Modul labelling (here X5; must show at front)
(4) Module X5

Fitting auxiliary connectors

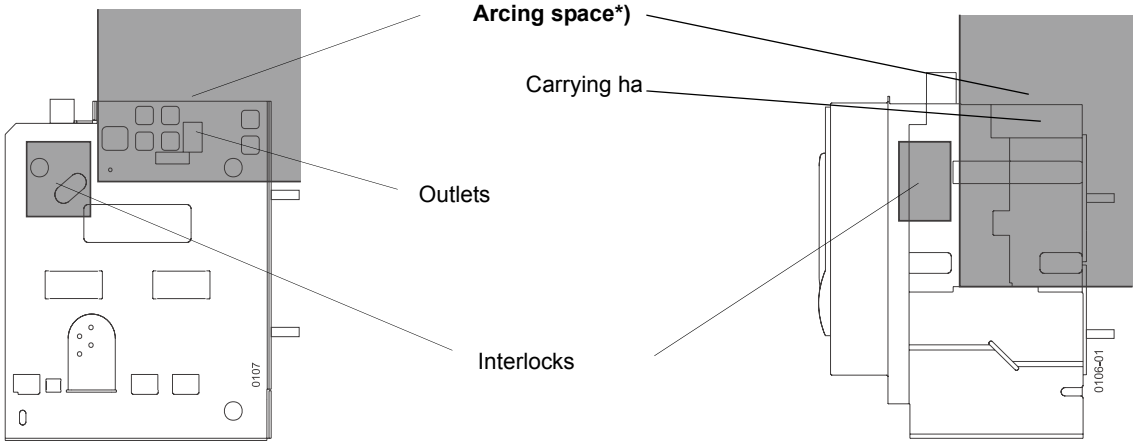


(1) Control circuit plug
(2) **Fixed mounting:** Knife contact rail
Withdrawable: Sliding contact module

5.4.4 Wiring on withdrawable unit



	Danger
	**Impermissible area for wires:** **Wires could be damaged.**



*)When arc chute cover is used control circuit wires must not be laid on this cover..

5.4.5 Assembly with control circuit connections

Terminal X6 always available. Depending upon the equiping of the circuit-breaker with additional accessories other terminals are necessary.

If necessary, with additional accessories the corresponding knife contact rail, control circuit plug and for connection area also sliding contact module must be retrofitted.

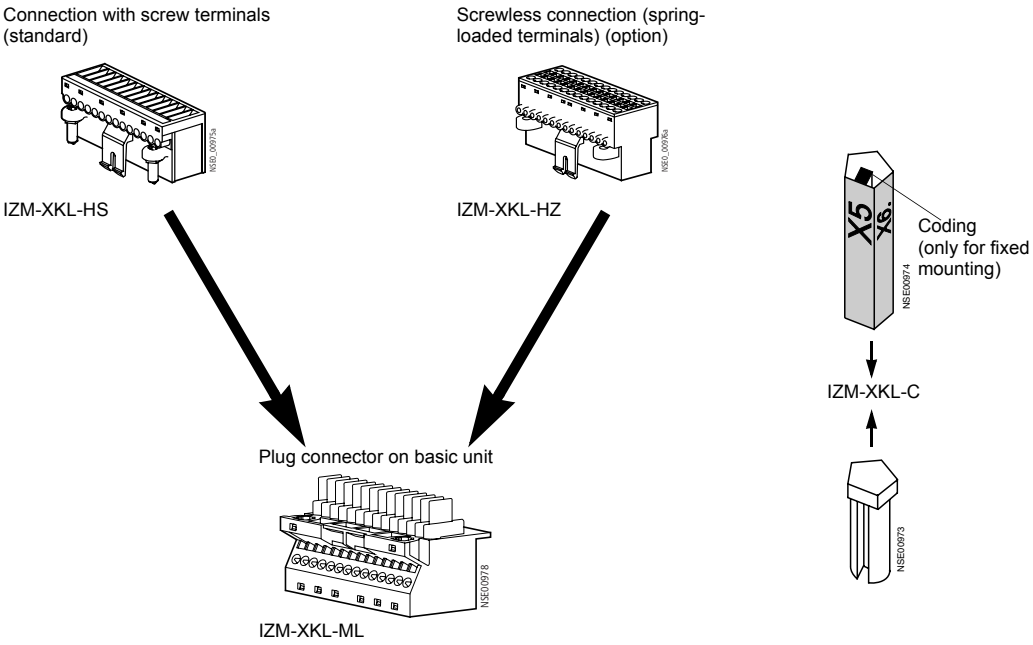
Terminal	Optional accessories
X5	– Motor drive with storage with mechanical and electrical release. – 2. Auxillary release (shunt release F2, undervoltage release F3, delayable undervoltage release F4) – Control circuit switch S3 + S4 or S7 + S8 or S3 + S8 – Motor cut-off switch S12 (only possible when motor drive selected)
X7	– Activated- signalling switch S24 – Stored condition indication S21 – Electrical ON pushbutton S10 – Signalling switch on 1st release S22 – Signalling switch on 2nd release S23
X8	– Overcurrent release XZMU, XZMD (internal System bus) – Connection for external current transformer for overload protection in N conductor and earth fault protection – Current transformer mounted in N conductor – Current transformer mounted in star point of transformer – Remote reset magnet F7 – External voltage transformer

5.4.6 Order numbers

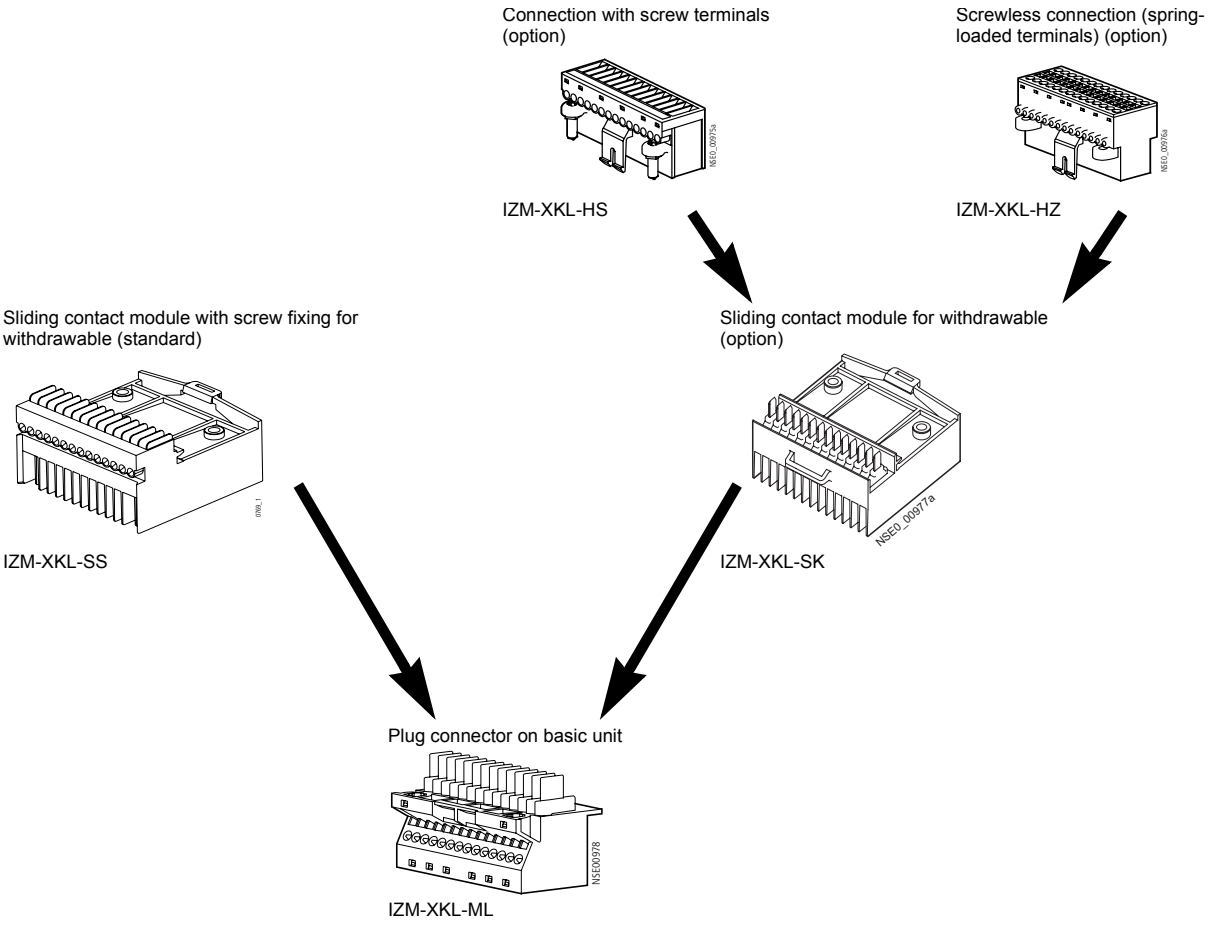
	Auxiliary conductors	Order numbers
A	Control circuit plug with screw terminals	IZM-XKL-HS
B	Spring-loaded terminals auxiliary conductor	IZM-XKL-HZ
C	Sliding contact module screw fixing / standard (only for withdrawable)	IZM-XKL-SS
D	Sliding contact module optional (only for withdrawable)	IZM-XKL-SK
E	Knife contact rail spring fixing	IZM-XKL-ML
F	Blanking cover (instead of a plug connector)	IZM-XKL-B
G	Coding set for fixed mounting for 4 control circuit plugs (not necessary for withdrawable)	IZM-XKL-C
H	For 1000 V withdrawable the following device is addditionally necessary: Additional knife contact rail for adpation on higher arc chute	IZM-XKL-AML1000V

Connection possibilities of the control circuit connections

Fixed mounted

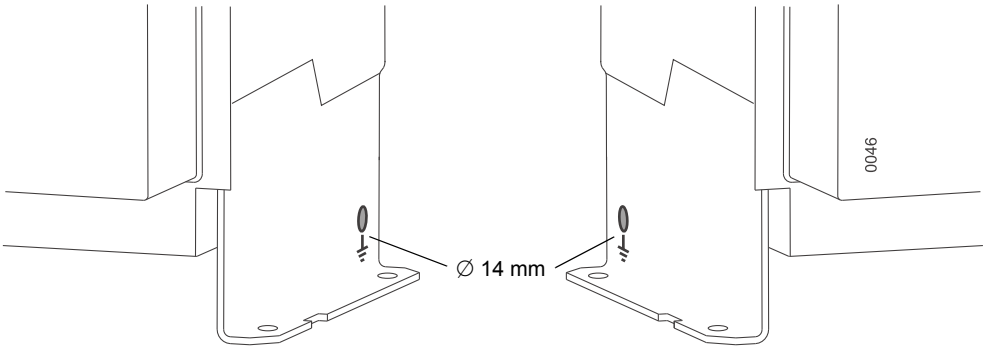


Withdrawable units

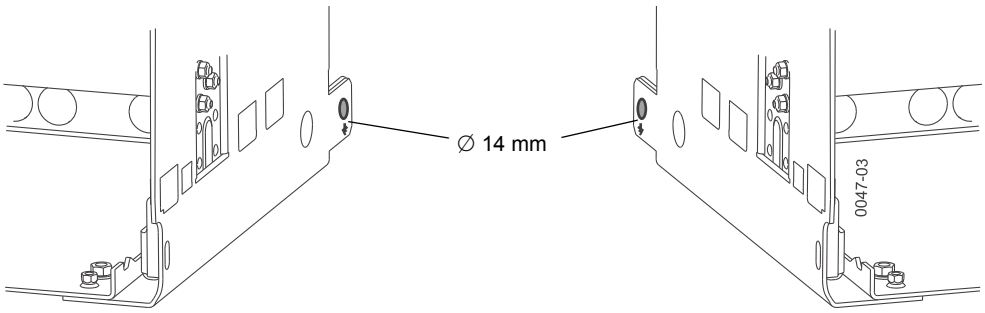


5.5 Connection of protective conductor

5.5.1 Fixed-mounted circuit-breaker



5.5.2 Withdrawable unit



5.6 Changeover of fixed mounting circuit-breaker into withdrawable circuit-breaker

Note

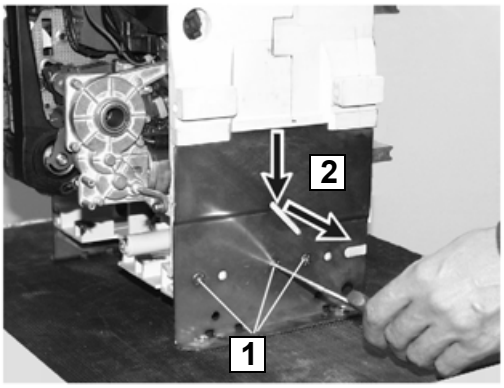
For the changeover of your circuit-breaker our After Sales Service can be used.

To contact After Sales Service: → chapter 26.

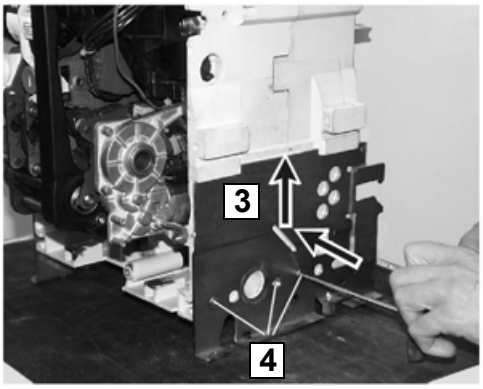
– Switching off and discharging the storage spring (→ page 24 – 2)
– Remove fixed-mounted circuit-breaker(→ page 5 – 1)
– Remove terminals other than horizontal terminals (→ page 5 – 7)
– Remove front panel (→ page 24 – 6)
– Remove overcurrent release (→ page 9 – 39)
– Install rated current coding on the new circuit-breaker feet and on the withdrawable unit (→ page 19 – 5)

5.6.1 Conversion

Replacing circuit-breaker feet




Size 4

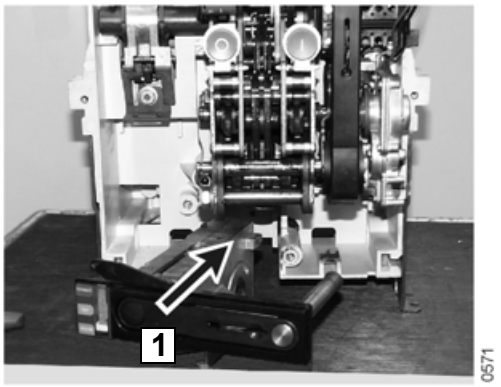


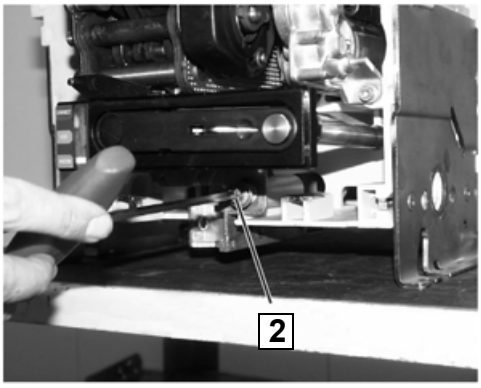

Size 4


10 Nm

1 Loosen and remove 3 M6x20 countersunk screws
2 Remove foot of fixed-mounted circuit-breaker
3 Replace by foot for withdrawable circuit-breaker
4 Attach the circuit-breaker foot with 3 countersunk M6x20 screws

Installing racking mechanism



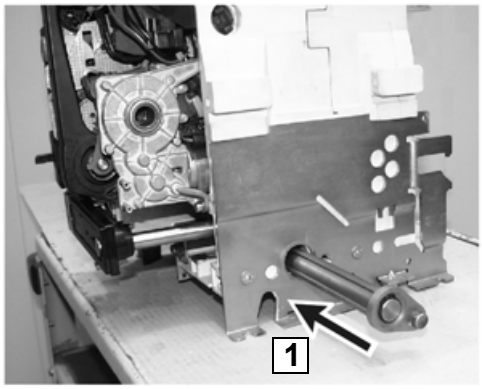


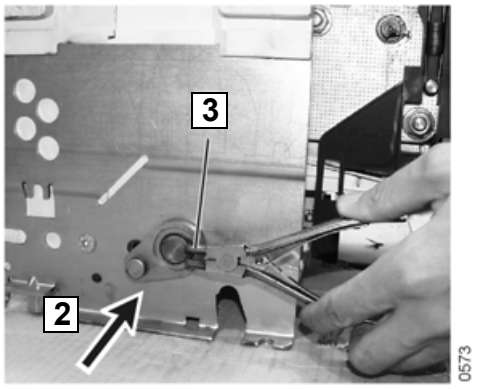

Size 5


***Nm**

1 Install racking mechanism
2 When threaded holes exist bolt the racking mechanism tight with M6x12 cheese-head screw, strain washer and 6x18x3 washer. When no screw thread exists grease a self-tapping screw and screw in.
*) Tightening toque :machine screw 6 Nm
self-tapping screw 5 Nm

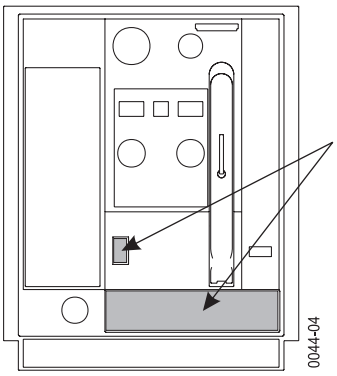
Installing racking shaft

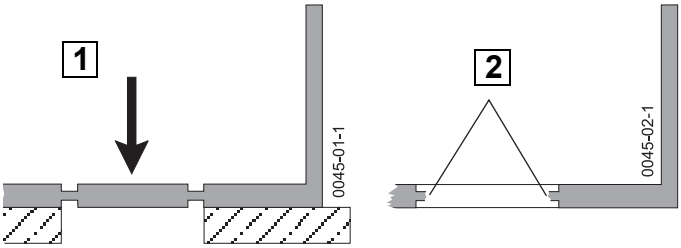




1 Insert racking shaft
2 Fit crank
3 Secure crank handle with circlip DIN 471-17x1

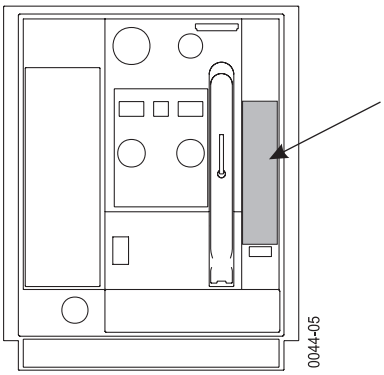
Knock out front panel





1 Knock-out section from operating panel; use suitable support
2 Deburr the edges

Fix adhesive label at the front panel



Then:

– Fit control gate(→ page 15 – 3)
– Install overcurrent release (→ page 9 – 39)
– Install front panel (→ page 24 – 13)
– Assemble the required terminals on the withdrawable unit (must be ordered separately) (→ page 5 – 7)
– Install withdrawable unit (→ page 5 – 1)
– Insert the circuit-breaker in the withdrawable unit and rack into connected position (→ page 6 – 1)

Conversion kit part numbers

Conversion kit for fixed-mounted into withdrawable circuit-breaker.

Frame size	Part no.
IZM(IN).1-...	IZM1-XUS-AV
IZM(IN).1-4-...	IZM1-XUS4-AV
IZM(IN).2-...	IZM2-XUS-AV
IZM(IN).2-4-...	IZM2-XUS4-AV
IZM(IN).3-...	IZM3-XUS-AV
IZM(IN).3-4-...	IZM3-XUS4-AV

Note

Conversion kits can only be ordered using the part no. shown above and also giving the Indent no. of the circuit-breaker.

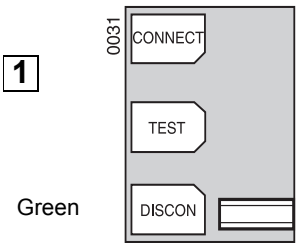
6 Commissioning

6.1 Preparation of withdrawable circuit-breaker

6.1.1 Inserting the circuit-breaker in withdrawable unit

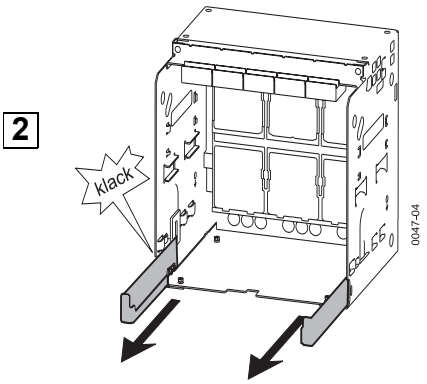
CAUTION
Remove padlocks on the shutter!

Check circuit-breaker position indicator

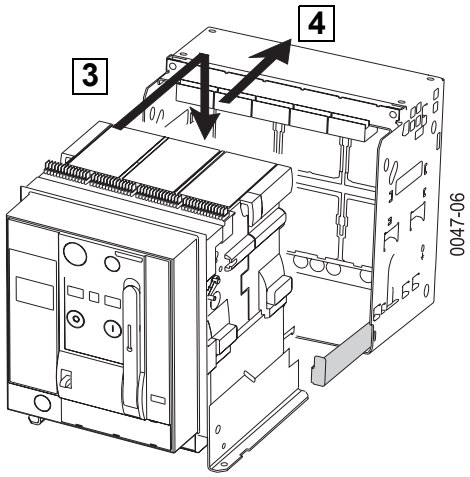


CAUTION
Ensure it shows DISCON. Otherwise the circuit-breaker cannot be inserted.

Pull out guide rails

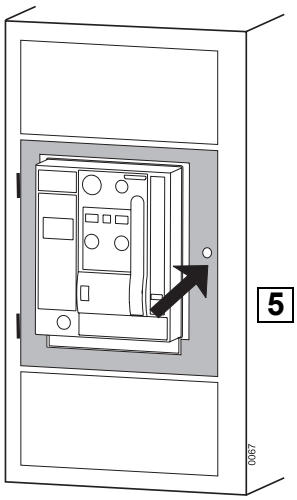


Place the circuit-breaker in the withdrawable unit and push it into disconnected position

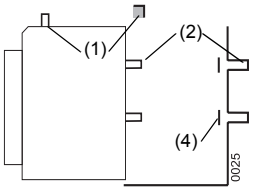
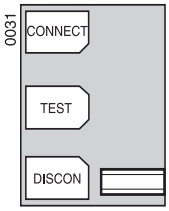
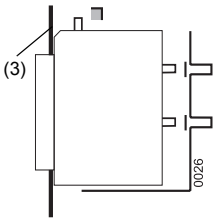
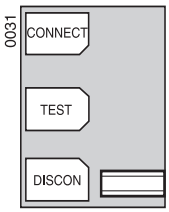
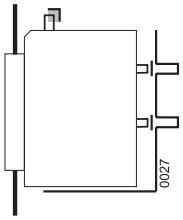
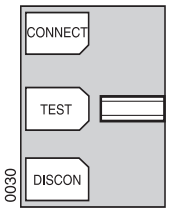
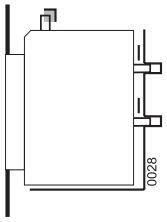
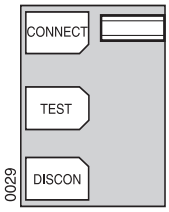


CAUTION
Push circuit-breaker as far as the stop into the disconnected position; the latches at the side must engage!

Close the panel door

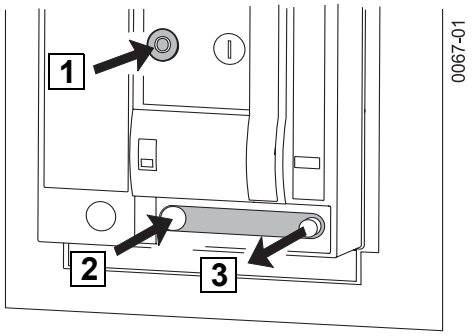


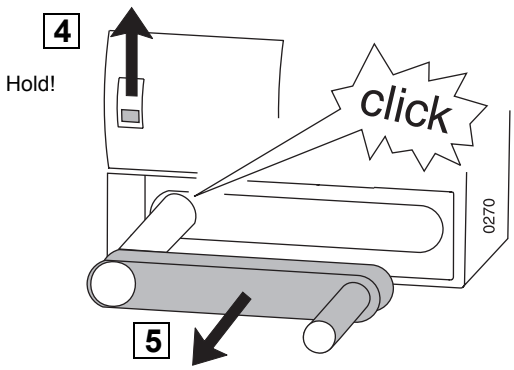
6.1.2 Position of the circuit-breaker in the withdrawable unit

	Diagram	Position indicator	Power circuit (2)	Auxiliary circuit (1)	Panel door (3)	Shutters (4)
Maintenance position		Green 	Disconnected	Disconnected	Open	Closed
Disconnected position		Green 	Disconnected	Disconnected	Closed	Closed
Test position		Blue 	Disconnected	Connected	Closed	Closed
Connected position		Red 	Connected	Connected	Closed	Open

(1) Auxiliary circuit
(2) Power circuit
(3) Panel door
(4) Shutter, optional

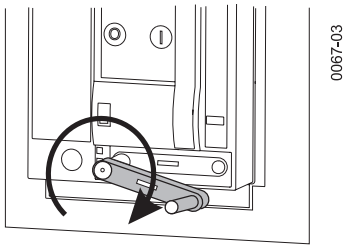
6.1.3 Release racking handle/withdraw racking handle

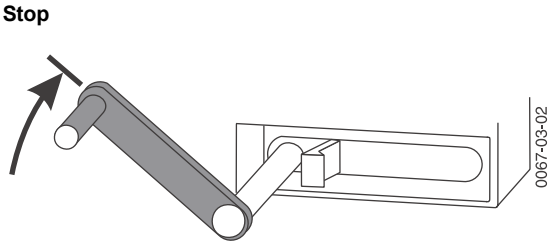




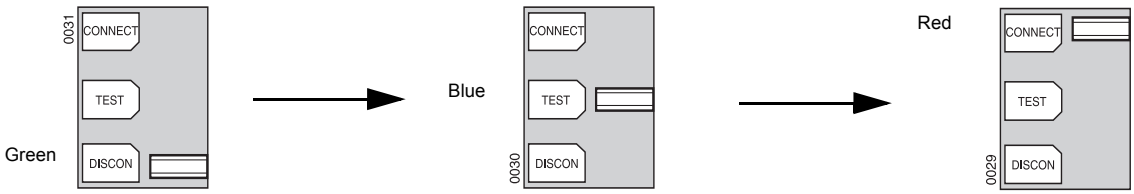
1 Switch off
2 Push in crank
3 Draw out handle
4 Press lever up and hold
5 Pull out crank

6.1.4 Circuit-breaker to connected (CONNECT) position

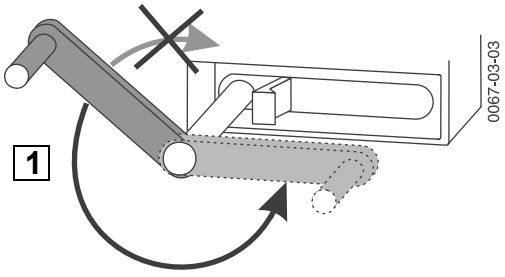


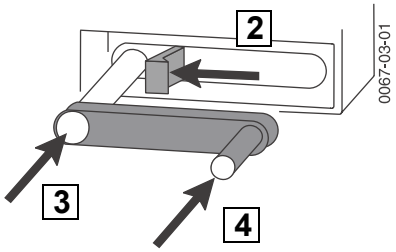


Position indicator



6.1.5 Insert racking handle



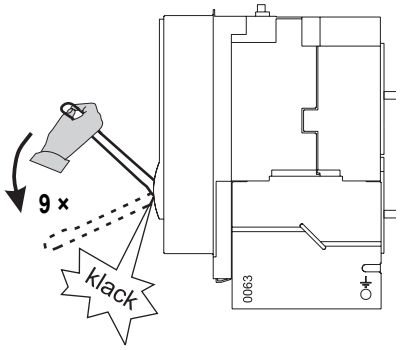


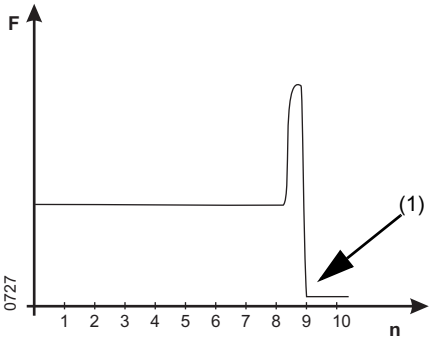
CAUTION
Do not turn the crank handle beyond the stop! Otherwise the racking mechanism will be damaged.

6.2 Charging the spring

Charging by hand

	WARNING
	**Can cause personal injury.** Support a withdrawn, free-standing circuit-breaker properly before charging (e.g. by maintenance work on the work bench).





F Operating force
n Number of strokes
(1) Spring is charged

ATTENTION
To charge the spring, grip the pump handle tightly and make each stroke fully and continuously to the end. The 9th stroke must be carried out exactly as the previous eight although the operating force considerably increases. When the spring is fully charged the lever moves without resistance.

Charging by motor drive

The motor drive starts automatically after connection of power supply. At the end of the charging process the motor automatically switches off.

Directly after the spring is discharged the motor switches on again so that the spring is again charged (after a switch on).

→ Retrofitting the motor operator (page 12 – 1)

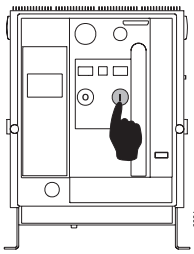
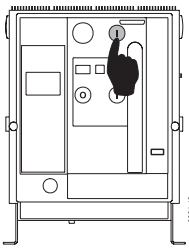
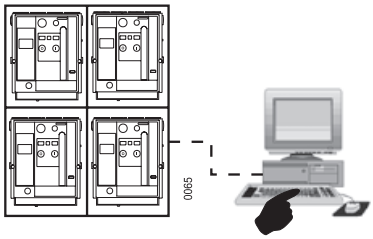
	Danger
	**Hazardous voltage!** **Can cause death or serious personal injury as well as damage to device and equipment.** Before working on this device the system must be switched off.

6.3 Checklist for commissioning

Work to be done		✓
Switch off circuit-breaker		
Move to connected position with withdrawable circuit-breaker		
Insert rating plug → Rated current module (page 9 – 35)		
Press red pin to reset Mechanical reclosing lockout		
Set the overcurrent release to appropriate values → Overcurrent release (page 9 – 1)		
Apply auxiliary and control voltages		
Close the panel door		
Inserting racking handle		
Charging the storage spring		
Conditions (according to version)		
Undervoltage release	Energized	
Shunt release	Not energized	
Electrical closing lockout (→ page 8 – 3)	Not energized	
Electrical interlocking of closing release in the switch board control wiring	Disabled	
Mutual mechanical interlock	Not effective	
Locking devices	Not activated	
Indications		
		

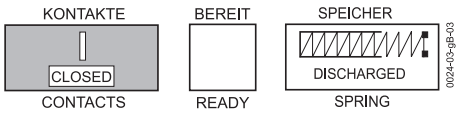
6.4 Closing

Indications

On switch	Electrical ON	Remote operation
 or	 or	

Indications

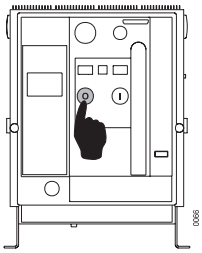
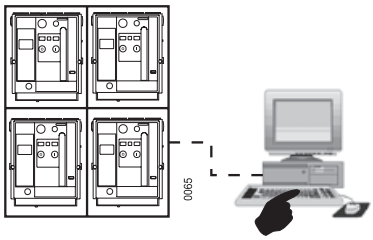
Without motor operating



With motor operating mechanism after 10 s

(The storage spring will be recharged by the motor operating mechanism immediately after the circuit-breaker has closed.)

6.5 Switch off

OFF button	Remote activation
	or 

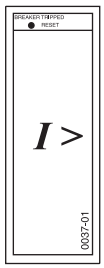
Indications

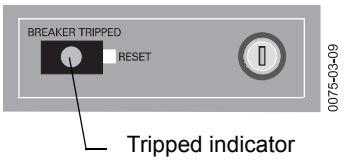
Without motor operating

With motor operating mechanism (storage spring still charged)

6.6 Tripping by overcurrent release

Overcurrent release





Indications

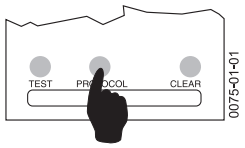
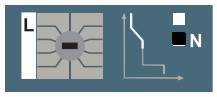
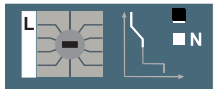
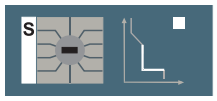
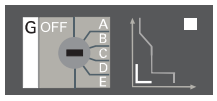
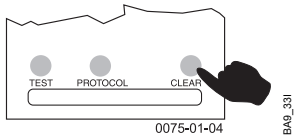
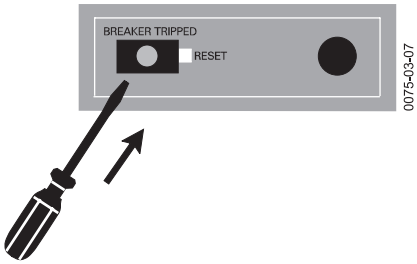
Without motor operating mechanism

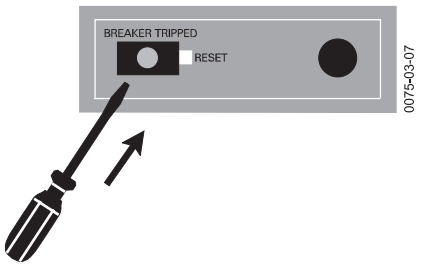
With motor operating mechanism (storage spring still charged)

6.7 Re-starting a tripped circuit-breaker

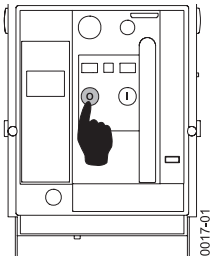
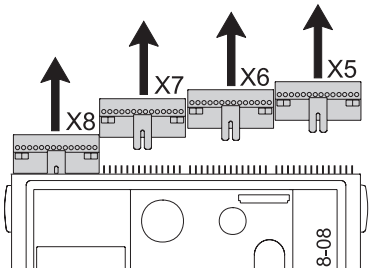
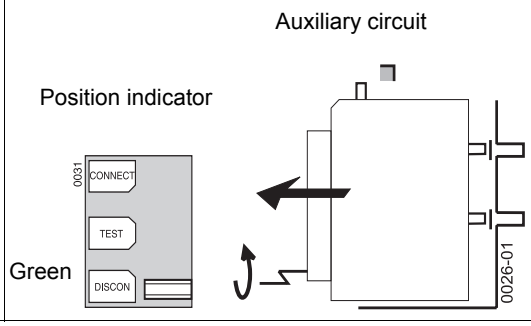
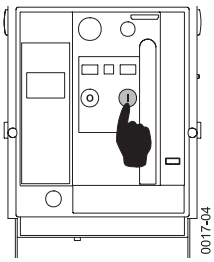
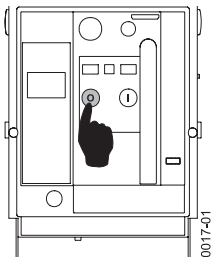
Note

The tripping reason can be inquired with the “PROTOCOL” button on the overcurrent release. It is stored for at least two days when the over current release is activated for at least 10 minutes before the tripping.

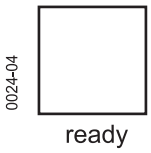
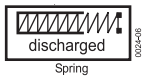
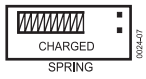
<table>
<tr><td>1
Find trip cause</td><td colspan="5"> 
</td></tr>
<tr><td rowspan="2">2
Indicator</td><td> 
</td><td> 
</td><td> 
</td><td> 
</td><td> 
</td></tr>
<tr><td>Overload in main conductor</td><td>Overcurrent in neutral conductor</td><td>Short-circuit: short-time-delay trip</td><td>Short-circuit: non delayed trip</td><td>Earth-fault trip</td></tr>
<tr><td>3
Find and remedy causes</td><td colspan="2">Check downstream load
Check overcurrent release settings</td><td colspan="3">Inspect panel
Check downstream load</td></tr>
<tr><td>4
Inspect circuit-breaker</td><td colspan="2"></td><td colspan="2">Inspect contact system for possible damage
→ Maintenance (page 24 – 1)</td><td></td></tr>
<tr><td>5
Clear trip cause</td><td colspan="5"> 
</td></tr>
<tr><td>6
Reset reclosing lockout</td><td colspan="3">Standard: Circuit-breaker with mechanical reclosing lockout</td><td colspan="2">Automatic reset reclosing lockout (→ page 10 – 2)</td></tr>
<tr><td>7
Reset tripped indicator</td><td colspan="3"> 

Manual reset reclosing lockout
and the trip message (→ page 10 – 1)</td><td colspan="2"> 
</td></tr>
<tr><td rowspan="2">8
Indications</td><td colspan="5">Without motor operating mechanism
 
</td></tr>
<tr><td colspan="5">With motor operating mechanism (storage spring still charged)
 
</td></tr>
<tr><td>9</td><td colspan="5">→ Charging the spring (page 6 – 4)
→ Closing (page 6 – 5)</td></tr>
</table>

6.8 Switching off and discharging the storage spring

	Fixed-mounted circuit-breaker	Withdrawable units
1 **OFF**		
2 **Disconnect control circuit power**		
3 **ON**		
4 **OFF**		
5 **Indications**		

6.9 Troubleshooting

Fixed-mounted circuit-breaker	Withdrawable circuit-breaker	Disturbance	Cause	Remedy
X	X	Circuit-breaker cannot be closed Circuit-breaker **not** ready to close Ready-to-close indicator shows: 	1. Storage spring not charged 	Charging the storage spring 
X	X		2. Undervoltage release not excited	Energize undervoltage release
X	X		3. Mechanical reclosing lockout effective	Rectify cause of overcurrent tripping and press reset button
X	X		4. Electrical closing interlock effective (→ page 8 – 3)	Shut off control voltage for interlocking[1)]
X	X		5. “Safe OFF” locked off by cylinder lock (accessories)	Unlock[1)]
X	X		6. “Safe OFF” locked off by padlocks (accessories)	Remove padlocks[1)]
X	X		7. “Mechanical OFF” button locked off (accessory)	Unlock the “Mechanical OFF” button[1)]
X	X		8. Emergency-Stop pushbutton engaged in operating position (accessory)	Release Emergency-Stop pushbutton[1)] by rotating it
X	X		9. Lockout against closing with panel door open effective (accessories)	Close the panel door
X	X		10. Mutual mechanical circuit-breaker interlocks effective (accessory)	Open second circuit-breaker or rack into disconnected position[1)]
X	X		11. Electronic overcurrent release missing or incorrectly installed	Fit electronic overcurrent release properly
X	X		12. Voltage release is actuated	Switch off voltage release
X	X		13. Switch on coil is activated	Switch off switch-on coil before re-switch on
	X		14. Racking handle withdrawn	Rack circuit-breaker into disconnected, test or connect position, unlatch crank and push crank fully in

X	X	Circuit-breaker cannot be closed though the circuit-breaker is ready to close Ready-to-close indicator shows: 	1. Closing release not energized or incorrectly energized	Check or apply correct voltage
	X		2. Circuit-breaker in disconnected position in withdrawable unit	Rack circuit-breaker into test or connected position
X			3. control circuit plug unplugged	Plug in control circuit plug

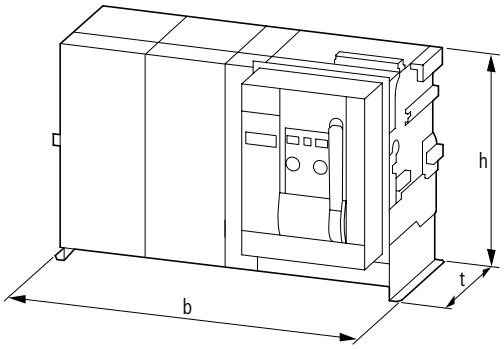
1) Safety feature! This remedy action amounts to a reversal (disabling) of a safety precaution installed earlier. Please do ensure that such disabling is now permissible/authorized!

Fixed-mounted circuit-breaker	Withdrawable circuit-breaker	Disturbance	Cause	Remedy
	X	Circuit-breaker cannot be moved from the maintenance position into the disconnected position	1. Racking mechanism of circuit-breaker not in disconnected position (note circuit-breaker position indicator)	Rack the mechanism into disconnected position (green position indication)
	X	Circuit-breaker cannot be fitted in the guide rails	1. Factory mounted coding of circuit-breaker and withdrawable unit doesn't match	Use circuit-breaker according to withdrawable unit label
	X	When racking from the disconnected into the test position, the circuit-breaker does not move during the first approx. 6 turns	1. Not a fault	Rack further
	X	Racking handle cannot be drawn out	1. Circuit-breaker is closed	Press “Mechanical OFF” button and pull racking handle block out[2)]
	X		2. Panel door not completely closed (locking device as accessory)	Close the panel door
	X	Racking handle cannot be pushed in	1. Racking handle is interlocked	Rack circuit-breaker into disconnected, test or connect position, unlatch crank and push crank fully in
X		Panel door cannot be opened (door interlock as accessory)	1. Closed circuit-breaker is preventing opening of panel door	Open the circuit-breaker[2)]
	X		2. Circuit-breaker in connected position	Rack circuit-breaker into test or disconnected position[2)]

2) Only permissible if the power circuit may be interrupted!

7 Frame sizes, dimension drawings

7.1 Overview external dimensions



3-pole	Fixed mounted			Withdrawable units		
	b	h	t	b	h	t
IZM(IN).1-...	320	434	357	320	460	471
IZM(IN).2-...	460	434	357	460	460	471
IZM(IN).3-...	704	434	357	704	460	471

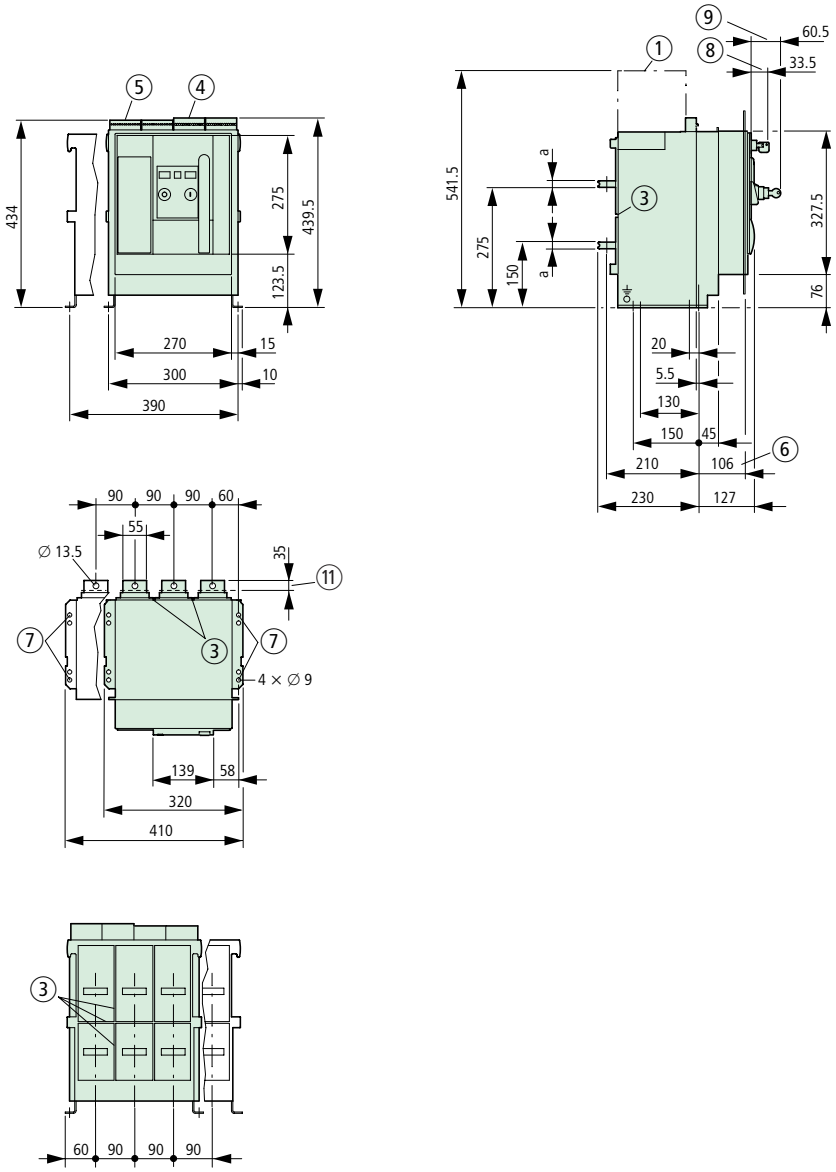
4 pole	Fixed mounted			Withdrawable units		
	b	h	t	b	h	t
IZM(IN).1-4...	410	434	357	410	460	471
IZM(IN).2-4...	590	434	357	590	460	471
IZM(IN).3-4...	914	434	357	914	460	471

Height “h” up to the top edge of the control circuit plug in screw terminal design for circuit-breaker/switch disconnector with $U_e \leqq 690$ V.

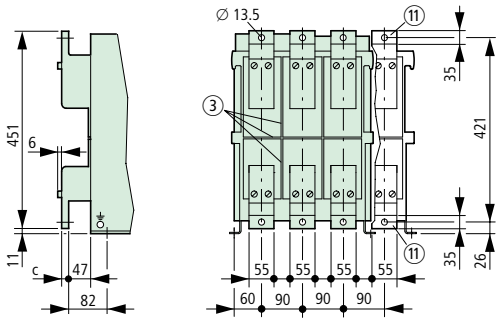
Depth “t” up to end of horizontal connection.

7.2 IZM(IN)...1-..., fixed-mounting, 3- and 4-pole

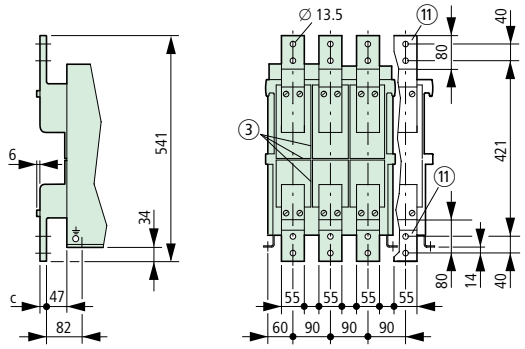
Standard version for horizontal connection



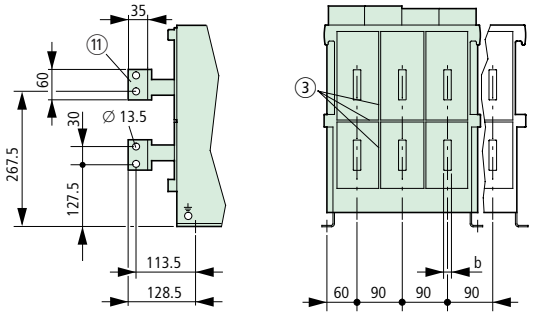
Front connection (single-hole fitting): IZM1-XAT1F...



Front connection (double-hole fitting): IZM1-XATF...



Vertical connection: IZM1-XATV...



Note

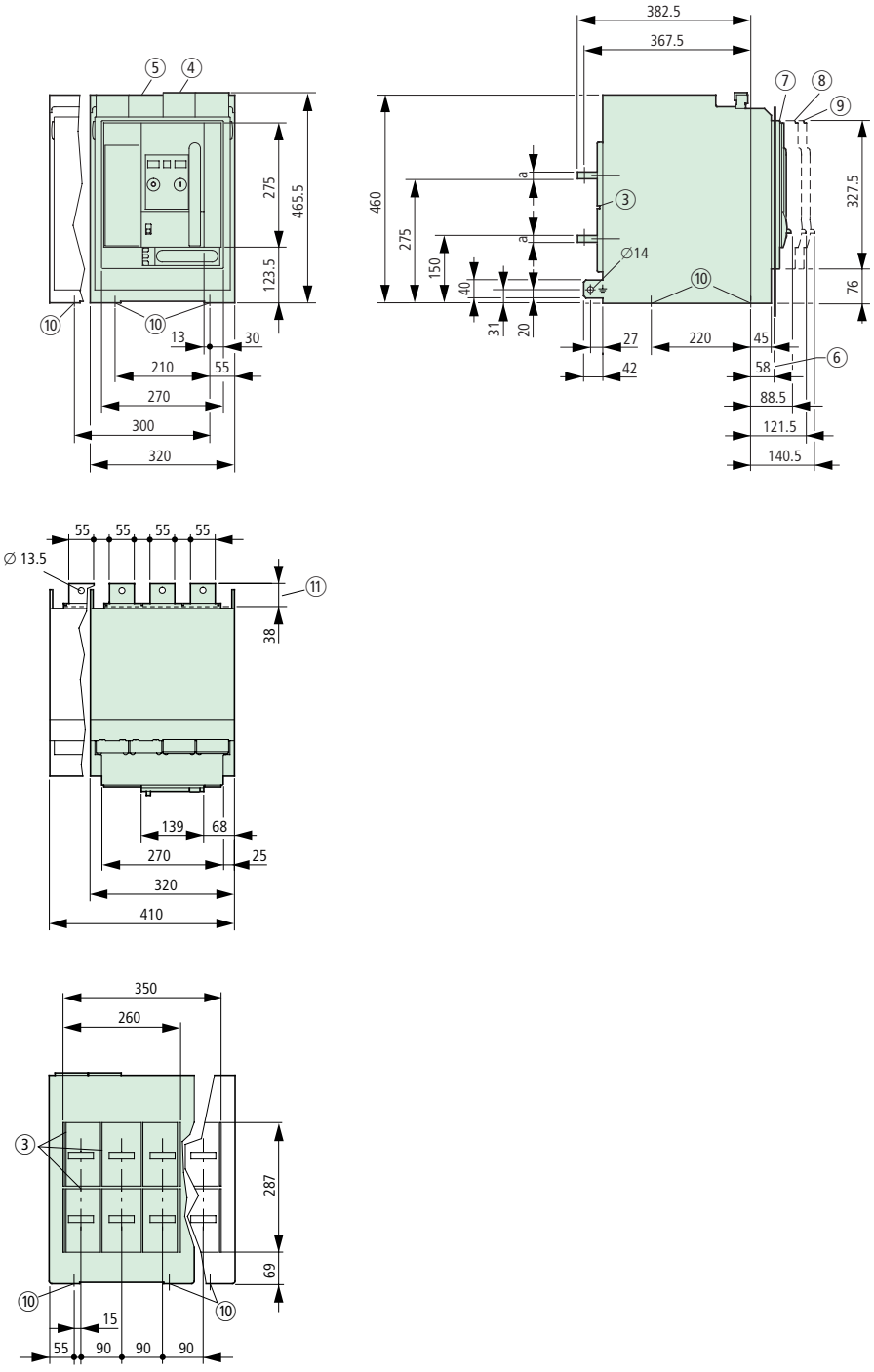
When front connections are used, a partition between busbar and arcing space must be fitted on the system side.

① Mounting space for removal of arcing chamber covers
③ Slots (4 mm wide, 5 mm deep) for supporting phase partions in the system
④ Control circuit plug, screw terminals
⑤ Control circuit plug, spring terminals
⑥ Dimension to inside of closed switchboard door
⑦ Fixing points for the circuit-breaker in the system; 4 × weld nut M8
⑧ Interlock in OFF (optional accessory)
⑨ Key operation (optional accessory)
⑪ Connection area

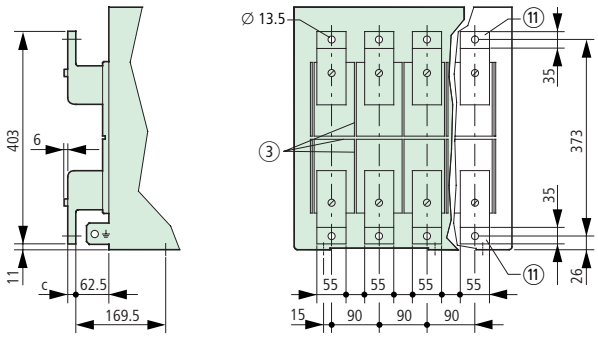
Rated current I_u	a	b	c
	Horizontal	Vertical	Front connection
Up to 1000 A	10	10	10
1250 – 1600 A	15	15	15

7.3 IZM(IN)...1-..., withdrawable, 3- and 4-pole

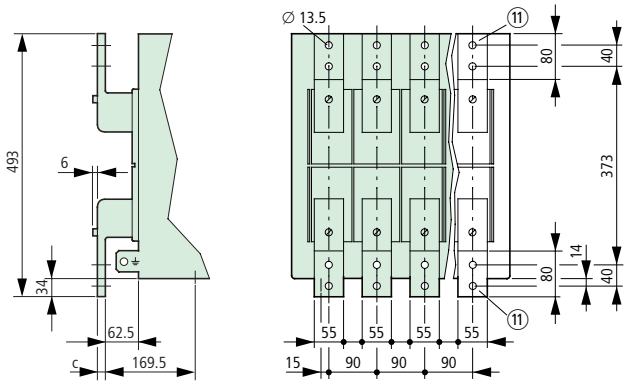
Standard version for horizontal connection



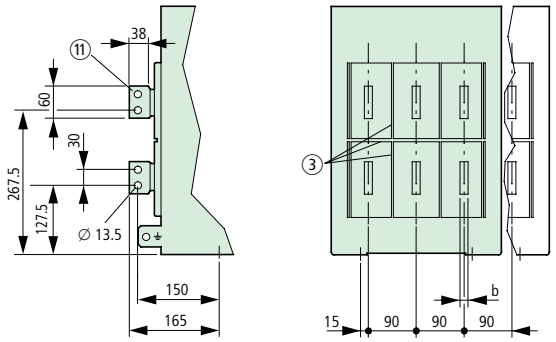
Front connection (single-hole fitting): IZM1-XAT1F...-AV



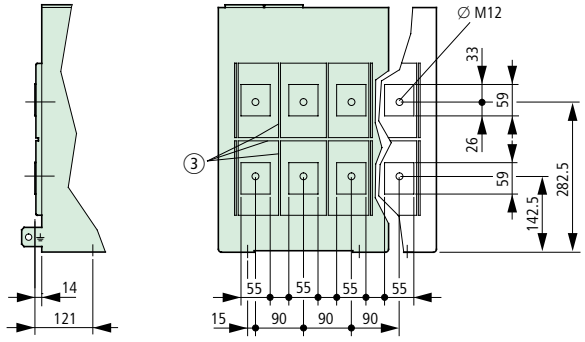
Front connection (double-hole fitting): IZM1-XATF...-AV



Vertical connection: IZM1-XATV...-AV



Flange connection: IZM1-XATA...-AV



Note

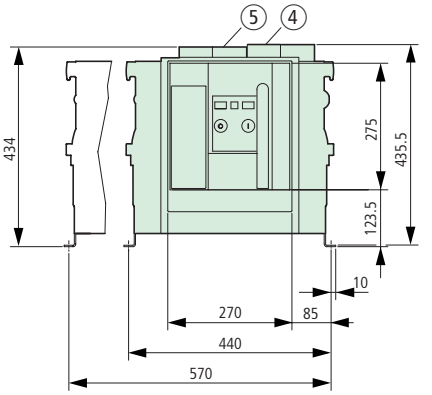
When front connections are used, a partition between busbar and arcing space must be fitted on the system side.

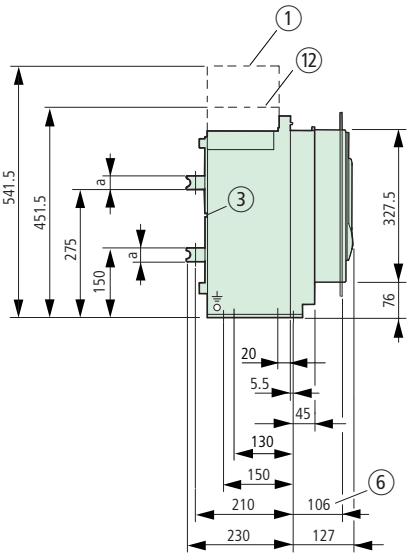
③ Slots (4 mm wide, 5 mm deep) for supporting phase partions in the system
④ Control circuit plug, screw terminals
⑤ Control circuit plug, spring terminals
⑥ Dimension to inside of closed switchboard door
⑦ IZM in connected position
⑧ IZM in test position
⑨ IZM in disconnected position
⑩ Fixing holes, ∅ 10 mm
⑪ Connection area

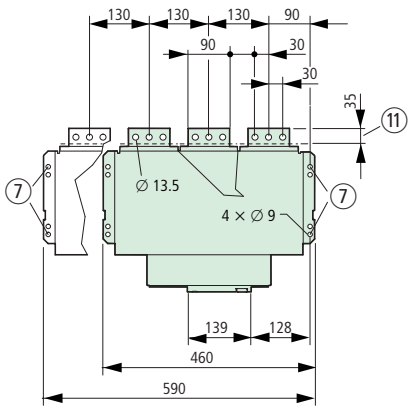
Rated current I_u	a	b	c
	Horizontal	Vertical	Front connection
Up to 1000 A	10	10	10
1250 – 1600 A	15	15	15

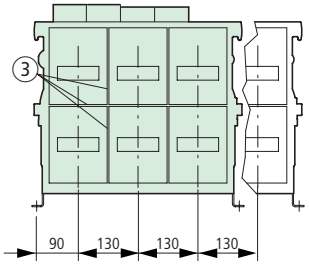
7.4 IZM(IN)...2-..., fixed-mounting, 3 and 4 pole

Standard version for horizontal connection

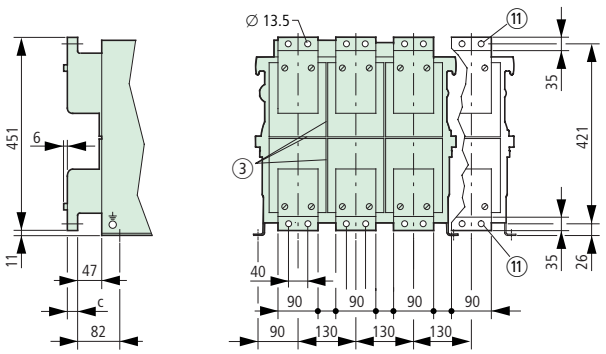




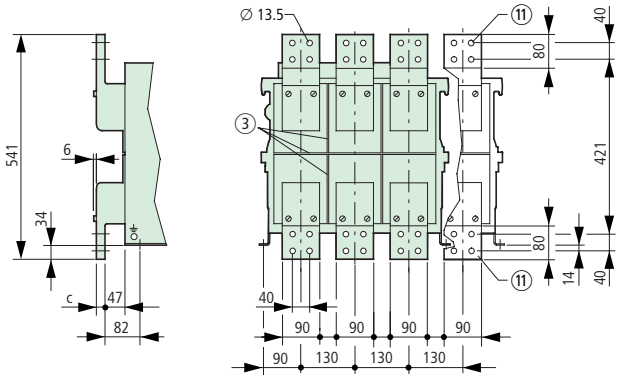




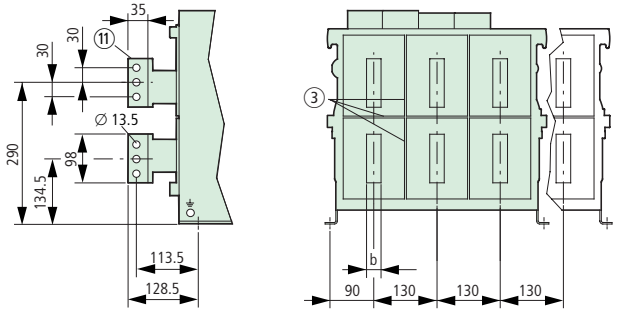
Front connection (single-hole fitting): IZM2-XAT1F...



Front connection (double-hole fitting): IZM2-XATF...



Vertical connection: IZM2-XATV...



Note

When front connections are used, a partition between busbar and arcing space must be fitted on the system side.

① Mounting space for removal of arcing chamber covers
With U_e = 1000 V, 175 mms are required for removal of the arcing chamber.

③ Slots (4 mm wide, 5 mm deep) for supporting phase partions in the system

④ Control circuit plug, screw terminals

⑤ Control circuit plug, spring terminals

⑥ Dimension to inside of closed switchboard door

⑦ Fixing points for the circuit-breaker in the system; 4 × weld nut M8

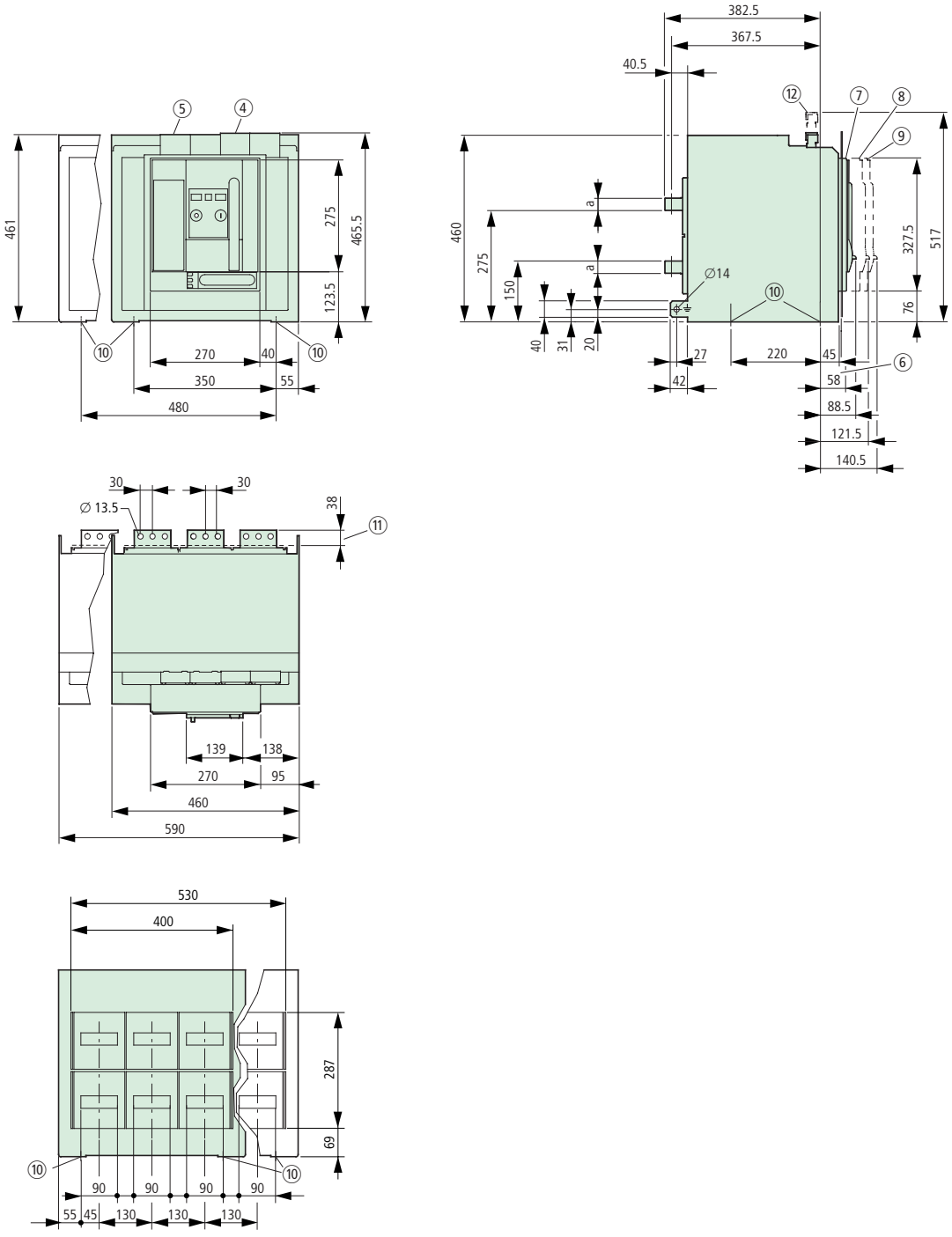
⑪ Connection area

⑫ Circuit-breaker top edge with U_e = 1000 V

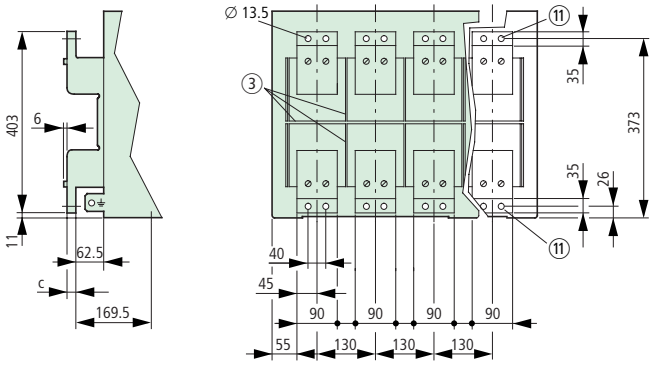
Rated current I_u	a	b	c
	Horizontal	Vertical	Front connection
UP to 2000 A	10	10	10
2500 A	15	15	20
3200 A	30	30	20

7.5 IZM(IN)...2-..., withdrawable, 3 and 4 pole

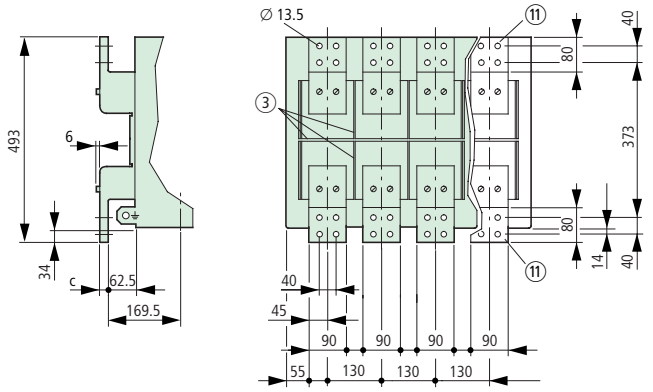
Standard version for horizontal connection



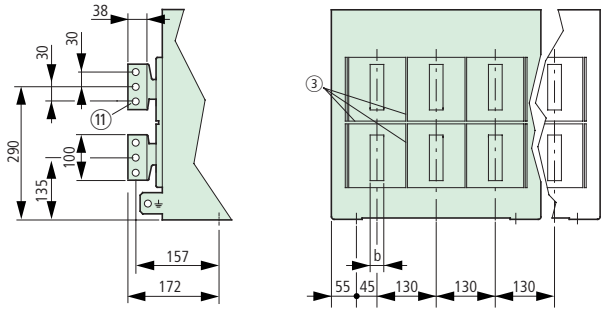
Front connection (single-hole fitting): IZM2-XAT1F...-AV



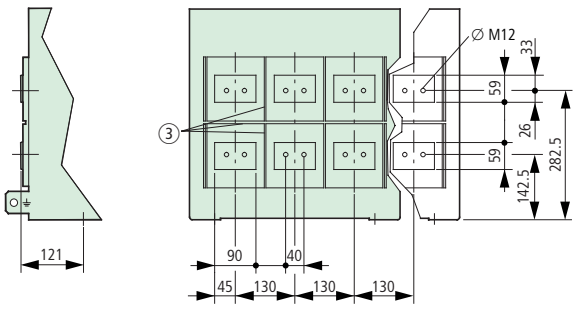
Front connection (double-hole fitting): IZM2-XATF...-AV



Vertical connection: IZM2-XATV...-AV



Flange connection: IZM2-XATA...-AV



Note

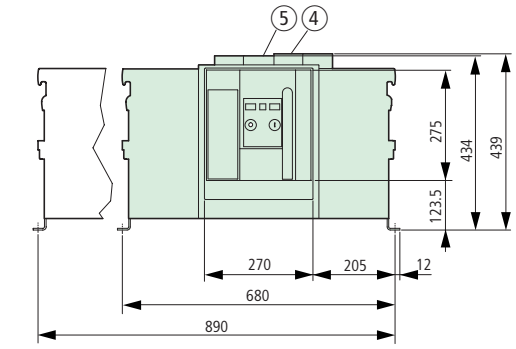
When front connections are used, a partition between busbar and arcing space must be fitted on the system side.

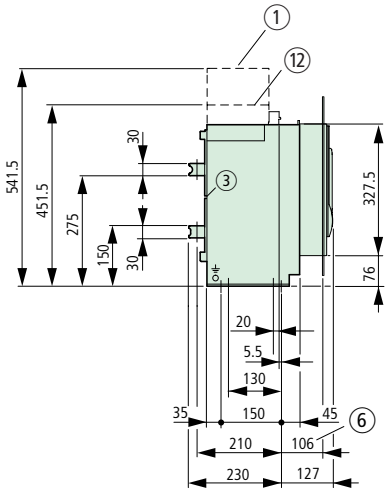
③ Slots (4 mm wide, 5 mm deep) for supporting phase partions in the system
④ Control circuit plug, screw terminals
⑤ Control circuit plug, spring terminals
⑥ Dimension to inside of closed switchboard door
⑦ IZM in connected position
⑧ IZM in test position
⑨ IZM in disconnected position
⑩ Fixing holes, ∅ 10 mm
⑪ Connection area
⑫ Top edge of withdrawable unit with U_e = 1000 V

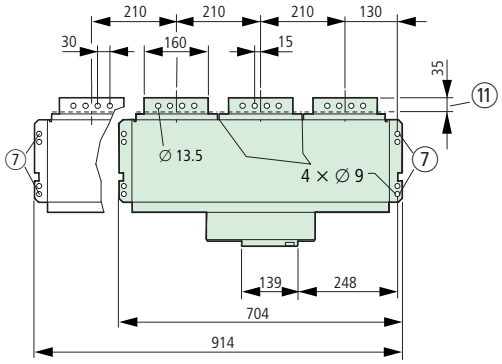
Rated current I_u	a	b	c
	Horizontal	Vertical	Front connection
Up to 2000 A	10	10	10
2500 A	15	15	20
3200 A	30	30	20

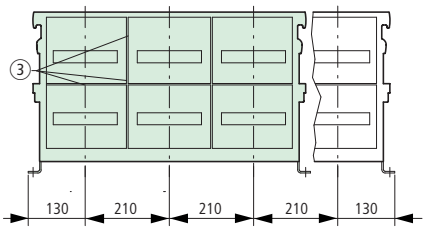
7.6 IZM(IN)...3-..., fixed-mounting, 3- and 4-pole

Horizontal connection, standard ≦ 6300 A

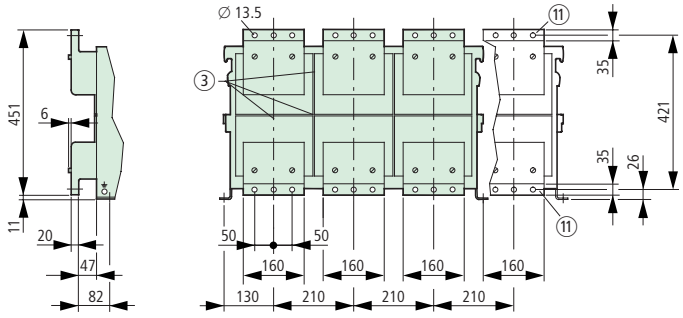








Front connection (single-hole fitting): IZM3-XAT1F...
≦ 4000 A

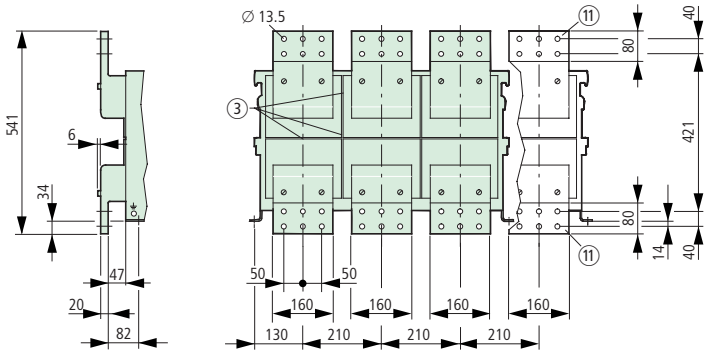


Note

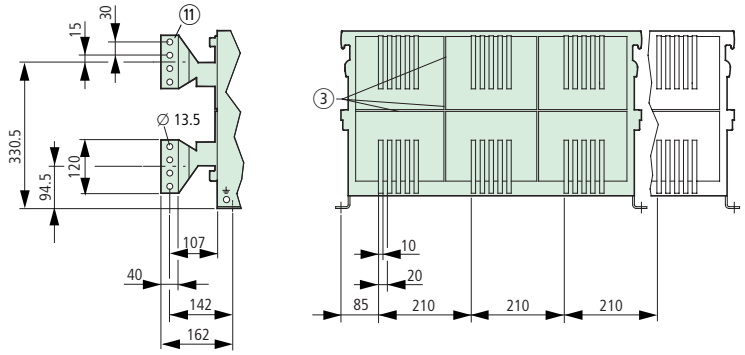
When front connections are used, a partition between busbar and arcing space must be fitted on the system side.

① Mounting space for removal of arcing chamber covers
With U_e = 1000 V, 175 mms are required for removal of the arcing chamber.
③ Slots (4 mm wide, 5 mm deep) for supporting phase partions in the system
④ Control circuit plug, screw terminals
⑤ Control circuit plug, spring terminals
⑥ Dimension to inside of closed switchboard door
⑦ Fixing points for the circuit-breaker in the system; 4 × weld nut M10
⑪ Connection area
⑫ Circuit-breaker top edge with U_e = 1000 V

Front connection (double-hole fitting): IZM3-XATF...
≦ 4000 A

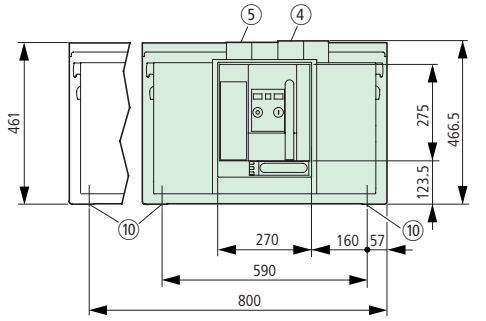


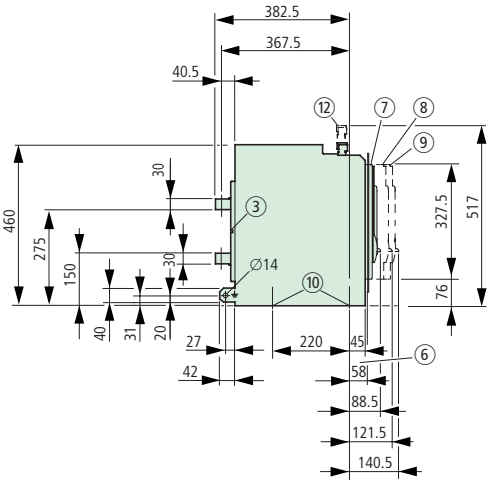
Vertical connection: IZM3-XATV... ≦ 5000 A

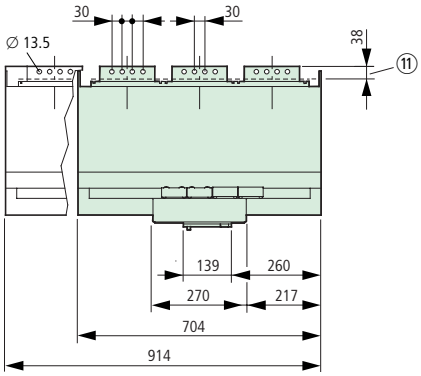


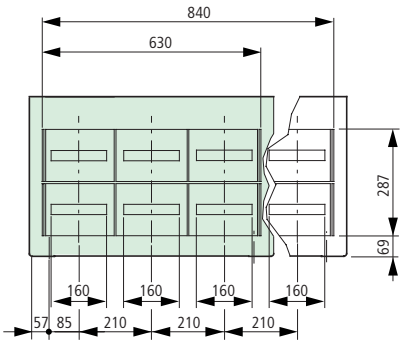
7.7 IZM(IN)...3-..., withdrawable, 3- and 4-pole

Horizontal connection, standard ≦ 5000 A

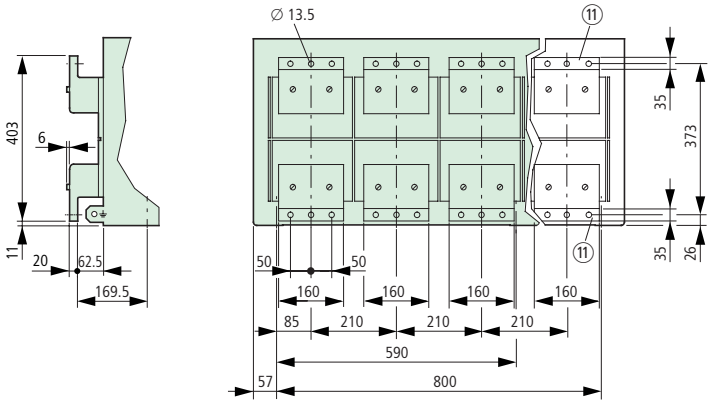




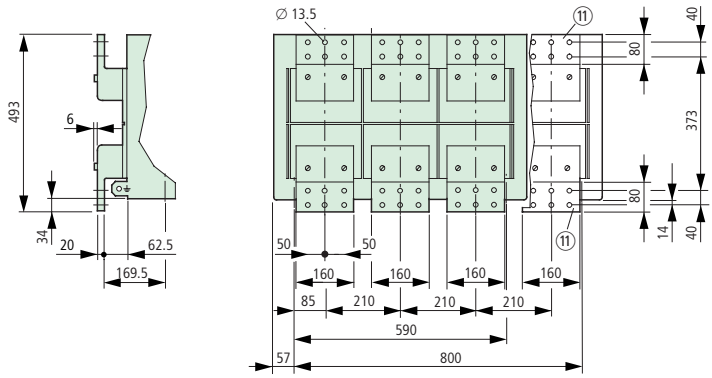




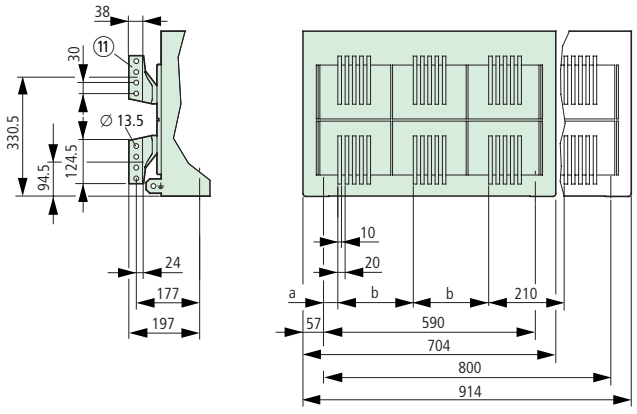
Front connection (single-hole fitting): IZM3-XAT1F...-AV ≦ 4000 A



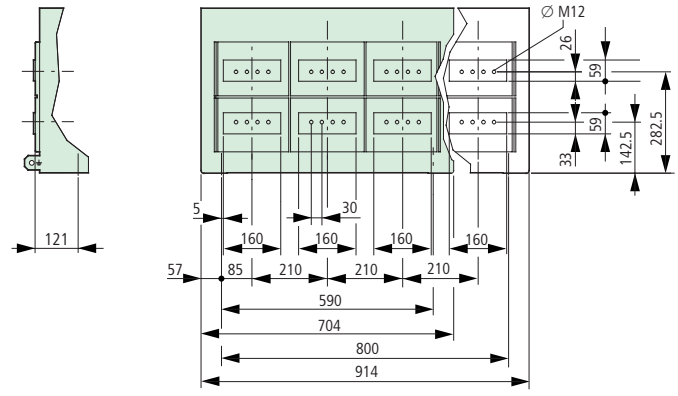
Front connection (double-hole fitting): IZM3-XATF...-AV ≦ 4000 A



Vertical connection: IZM3-XATV...-AV ≦ 6300 A



Flange connection: IZM3-XATA...-AV ≦ 4000 A



Note

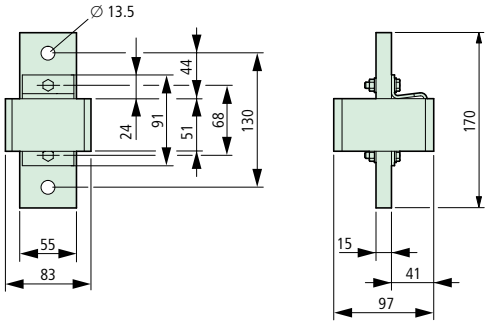
When front connections are used, a partition between busbar and arcing space must be fitted on the system side.

③ Slots (4 mm wide, 5 mm deep) for supporting phase partions in the system
④ Control circuit plug, screw terminals
⑤ Control circuit plug, spring terminals
⑥ Dimension to inside of closed switchboard door
⑦ IZM in connected position
⑧ IZM in test position
⑨ IZM in disconnected position
⑩ Fixing holes, ∅ 10 mm
⑪ Connection area
⑫ Top edge of withdrawable unit with U_e = 1000 V

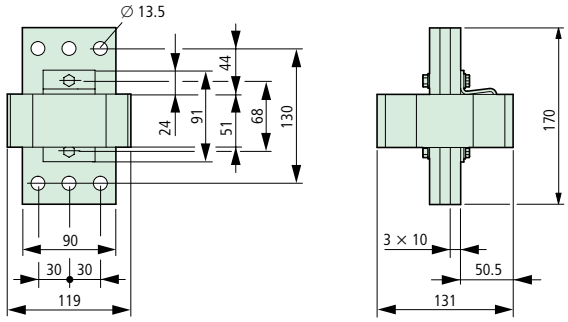
Rated current I_u	a	b
4000 A	40	210
5000 A	40	210
6300 A	5	245

7.8 External current transformer for N-conductor

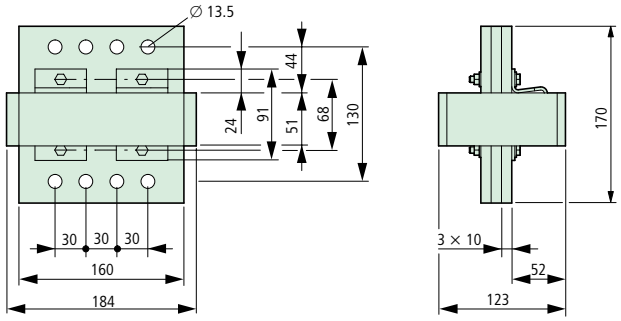
IZM.1-...



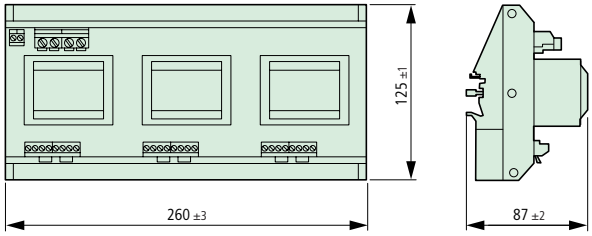
IZM.2-...



IZM.3-...



7.9 Voltage transformers



7.10 Further dimension drawings

– Mounting brackets for mounting on vertical surface (→ page 5 – 2)

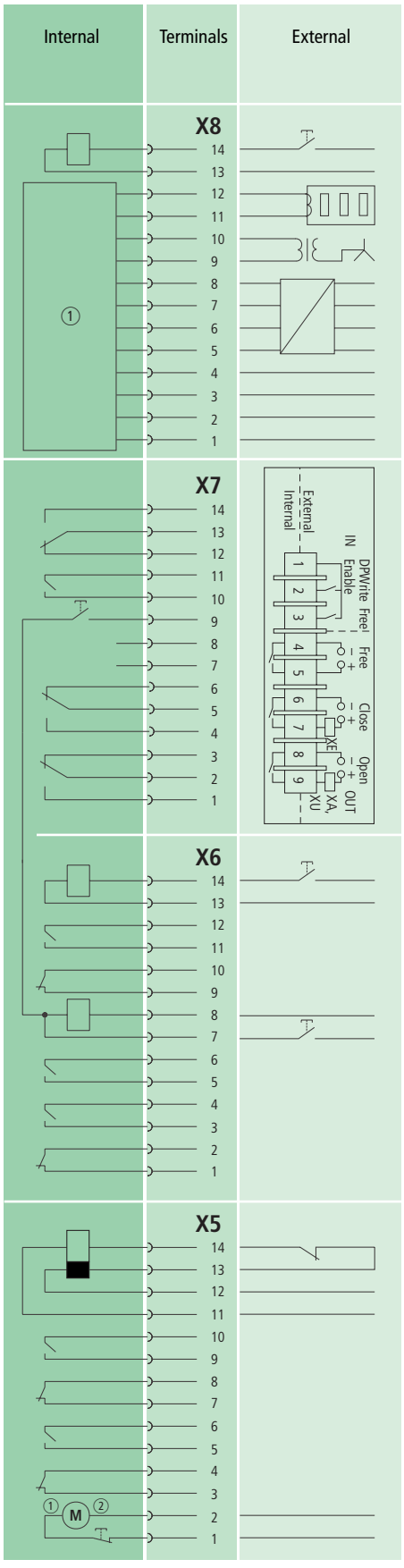
– Door sealing frame IP40 (→ page 22 – 1)

– Cover IP55 (→ page 23 – 1)

8 Circuit diagrams

8.1 Terminal assignment, accessories

Control circuit plug IZM-XKL(-AV) for customer connection
Control circuit plug X8, X7, X6, X5 are identical in construction



X8: optional control circuit plug (Standard for IZM...-U... and IZM...-D...)

Remote reset XFR

① electronic overload release

G transformer S2
G transformer S1
IZM-XW(C) N current transformer S2
IZM-XW(C) N current transformer S1
external voltage transformer, star
External voltage transformer L3
External voltage transformer L2
External voltage transformer L1
0 V DC
24 V DC
Internal system bus +
Internal system bus –

L/L+ Us
N/L-
e.g. current transformer in transformer's star point or summation current transformer 1200 A/1 A

bridge, when no N current transformer

L1, L2, L3, (N)

24 V DC external power supply

Termination resistor, when no external system bus module 120 Ω 0.5 W
(→ page 9 – 60)

X7: optional control circuit plug
Not available with IZM-XCOM-DP communication function.
The communications module is at position X7.

Trip signalling switch XHIA

"Spring charged" signal XHIF

electrical "on" XEE

XHIS signalling switch on first voltage release

Signalling switch on second release XHIS

IZM-XCOM-DP

L/L+ U_s

X6: standard control circuit plug

first shunt release XE/A

Standard auxiliary switch XHI: S1 "N/O"

Standard auxiliary switch XHI: S1 "N/C"

Closing release XE/A

"Ready to close" signal XHIB

Standard auxiliary switch XHI: S2 "N/O"

Standard auxiliary switch XHI: S2 "N/C"

L/L+ U_s
N/L-

N/L- U_s
L/L+

X5: optional **control circuit plug**

Only XUV "non-delayed release"

XU, XUV or second voltage release XA1

Standard auxiliary contact XHI11/XHI22/XHI31: S3 "NO", XHI40: S7

Standard auxiliary contact XHI11/XHI22/XHI31: S3 "NC", XHI40: S7

Standard auxiliary contact XHI22: S4 "NO", XHI31/XHI40: S8 "NO"

Auxiliary switch XHI22: S4 "N/C", XHI31/XHI40: S8 "N/O"

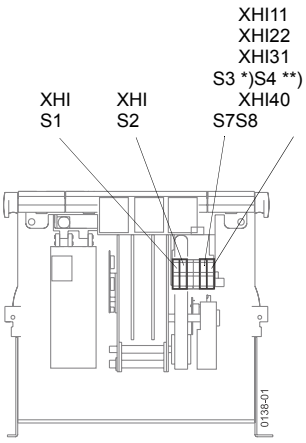
Motor operator
Optional motor cut-off switch XMS

① black-white
② brown

Emergency-Stop or short terminals
L/L+ U_s
N/L-

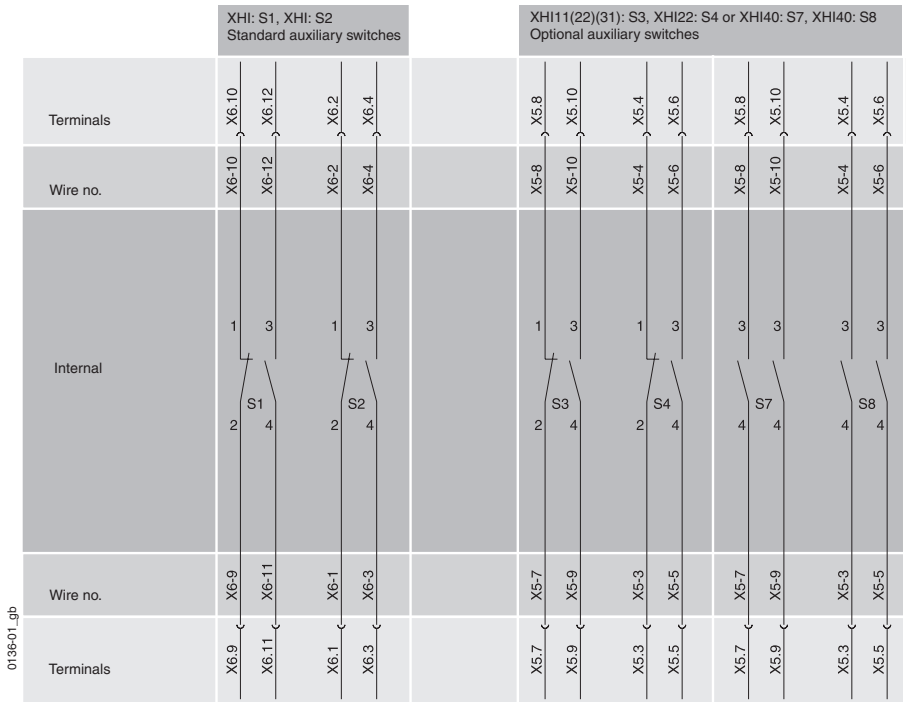
L/L+ U_s
N/L-

8.2 Auxiliary and control switches



*) same location as S7

**) same location as S8

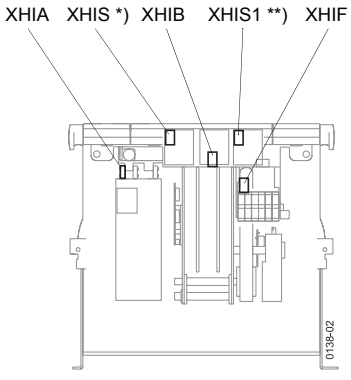


Part number suffix when ordered with basic device	Fitting with auxilliary contacts					
	S1	S2	S3	S4	S7	S8
Standard	X	X				
+IZM-XHI22	X	X	X	X		
+IZM-XHI40	X	X			X	X
+IZM-XHI31	X	X	X			X

Part number suffix when ordered seperately (mounting position as required)	Number	
	Normally open contact	Normally closed contact
IZM-XHI20	2	–
IZM-XHI11	1	1
IZM-XHI22	2	2

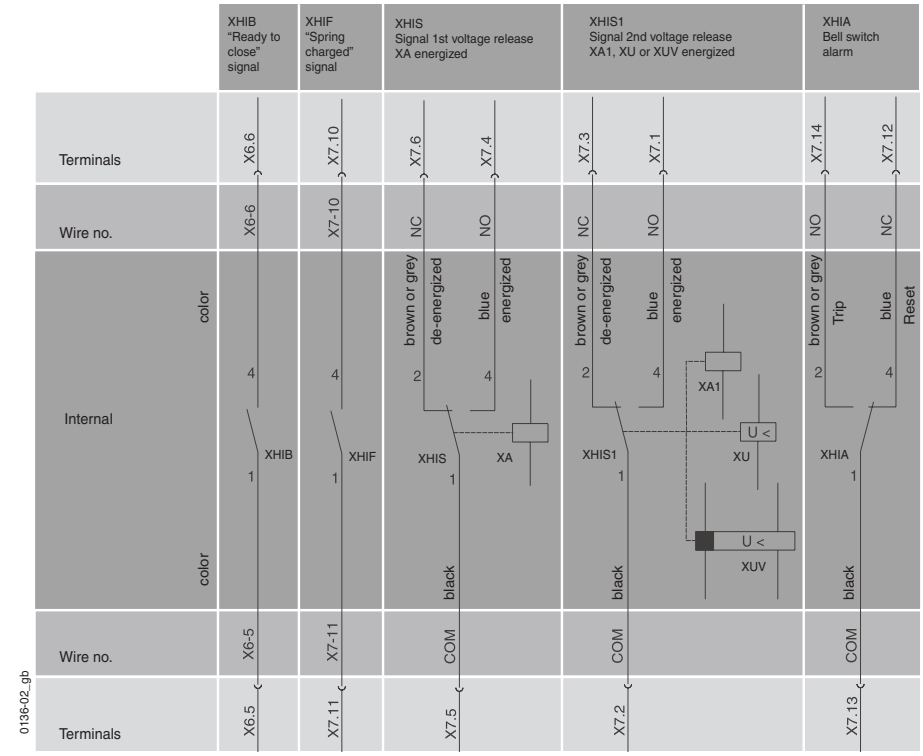
8.3 Signal switch

XHIA, XHIS, XHIS1 and XHIF cannot be combined with (+)IZM-XCOM-DP.
XHIA, XHIS and XHIS1 cannot be combined with (+)IZM-XBSS.



*) Same location as S42
(→ page 9 – 47)

**) Same location as S43
(→ page 9 – 47)



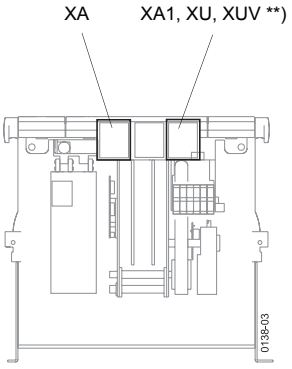
XHIS, XHIS1:

– N/O contact closed means undervoltage release activated or shunt release not activated– switch-on possible.

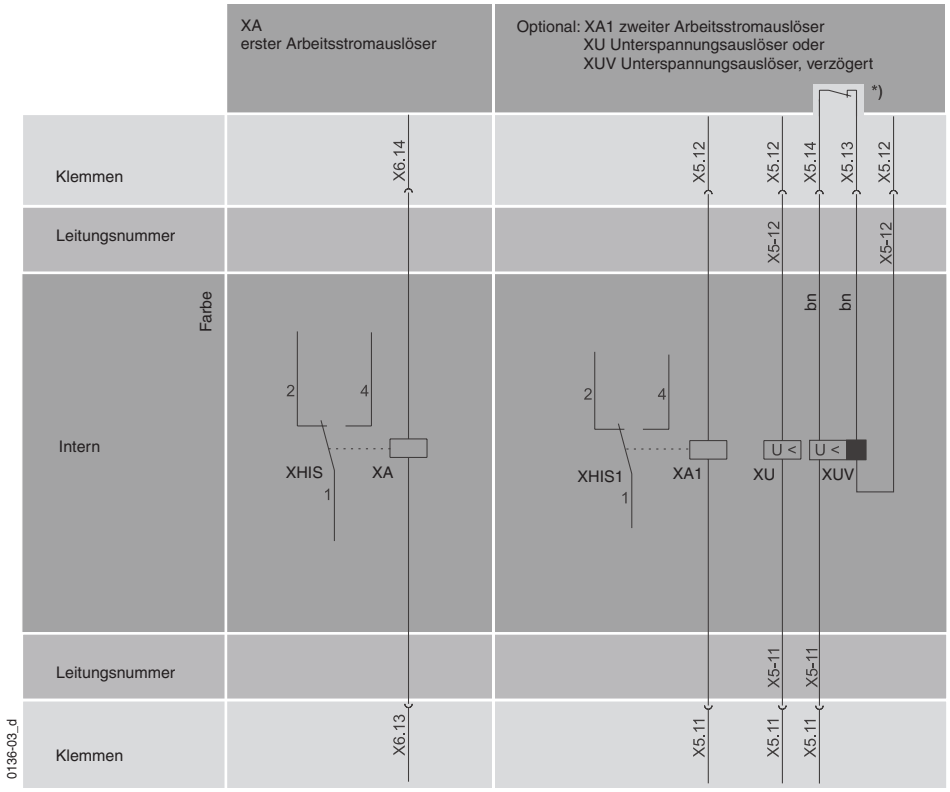
– N/O contact open means, undervoltage release deactivated or shunt release activated – not possible to switch circuit-breaker on.

8.4 Voltage release/electrical switch-on inhibit

XA, XA1 and XE have the same construction, an individual type is always designated XE/A.



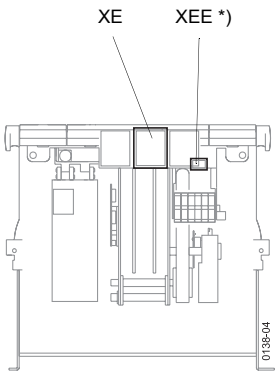
**) same location



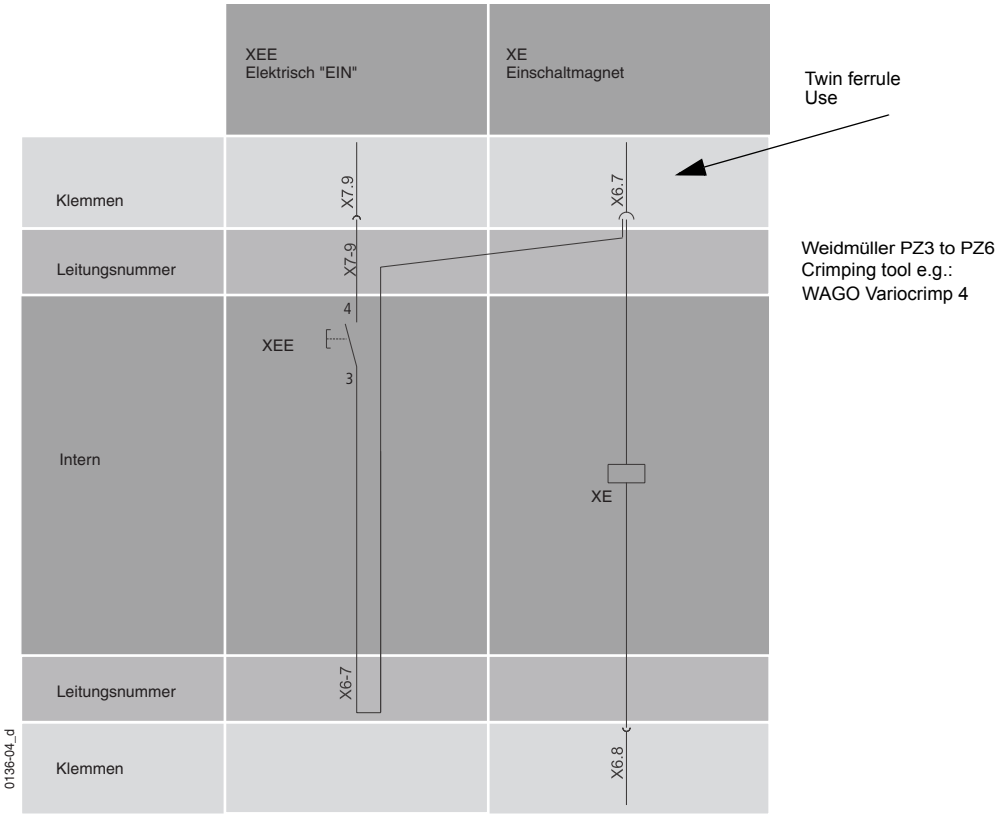
*) emergency stop or bridge

Voltage trips with 100 % DF may act as an electrical closing lockout.

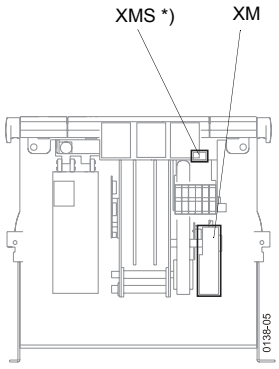
8.5 Closing release/electrical ON



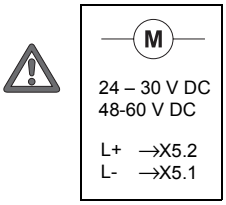
Same location as XMS

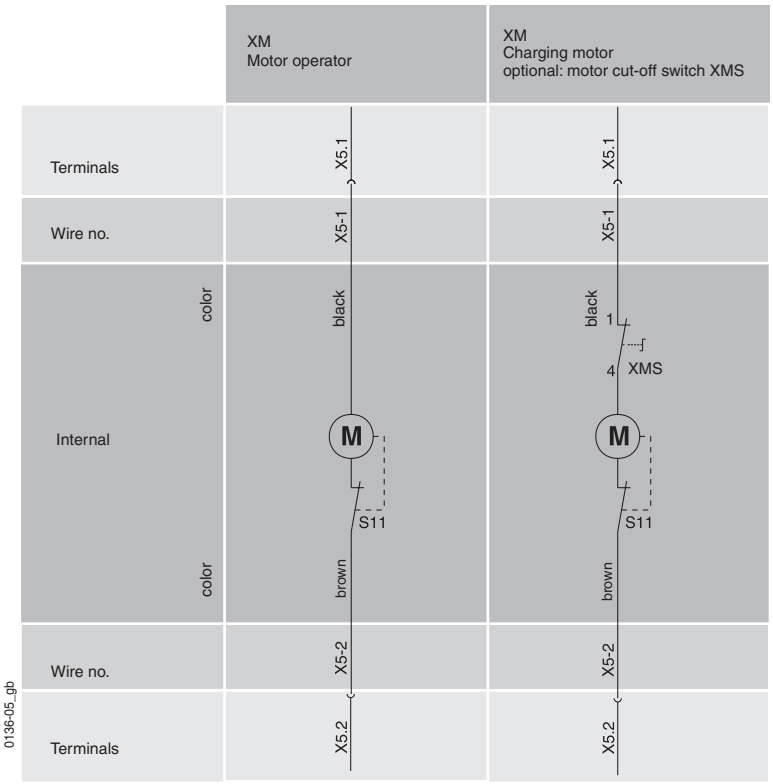


8.6 Motor operator

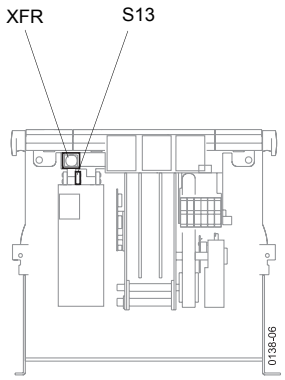


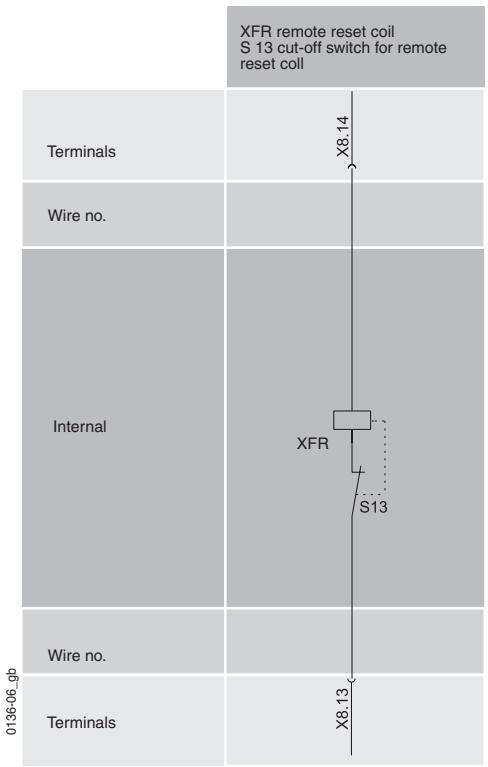
*) same location as XEE





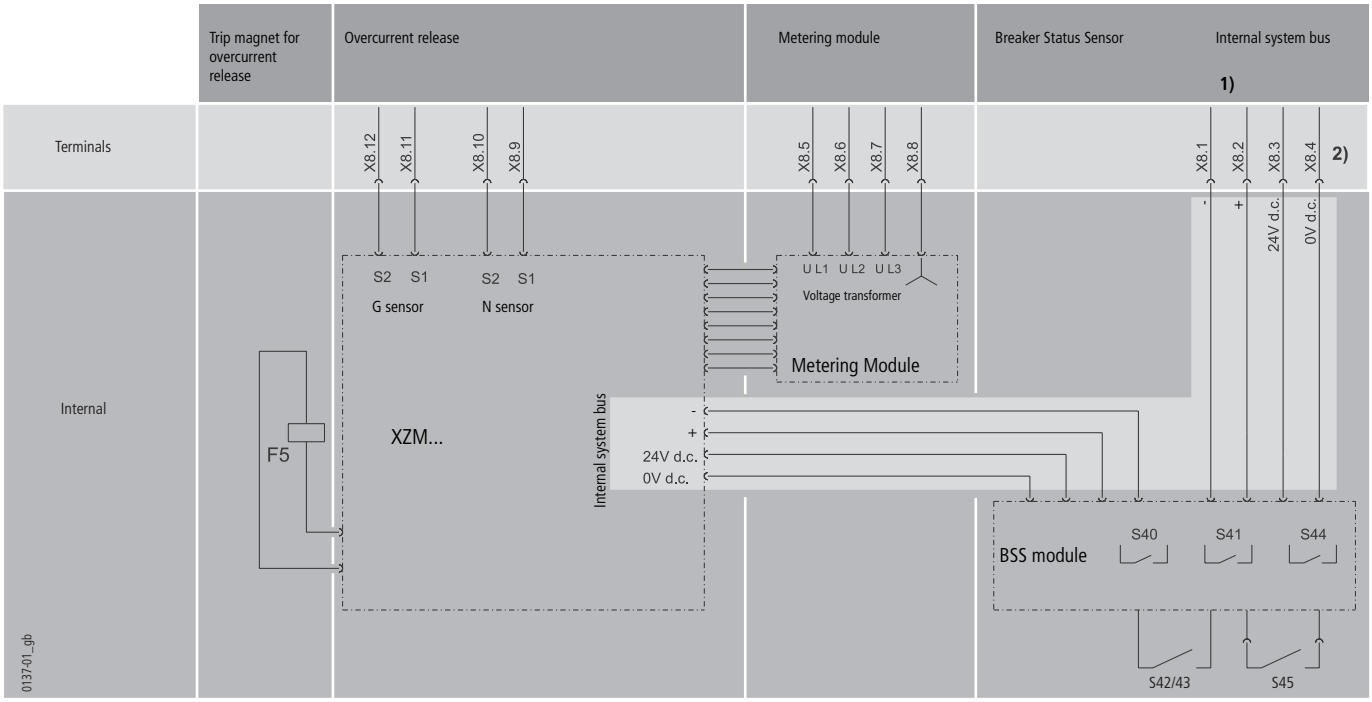
8.7 Remote reset coil





8.8 Protection circuit for overcurrent release XZMU, XZMD

8.8.1 With Breaker Status Sensor (XBSS) and metering module XMH



1) Terminating resistor on X8-1 / X8-2, when no external systembus module.

2) When no metering module and also no BSS module is used: direct connection X8 to XZM...

– BSS module: Breaker Status Sensor

– Internal system bus: Bus system for interconnection of circuit-breaker components to each other and to the field-bus (PROFIBUS-DP)

– XZM...: Overcurrent release

– S40 Signalling switch ready-to-close

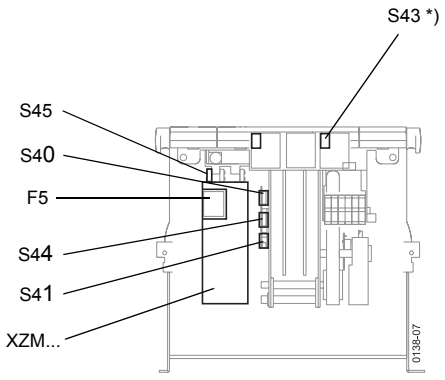
– S41 Signalling switch spring charged

– S42 Signalling switch on first release XA...

– S43 Signalling switch on second release XA1 or XU or XUV

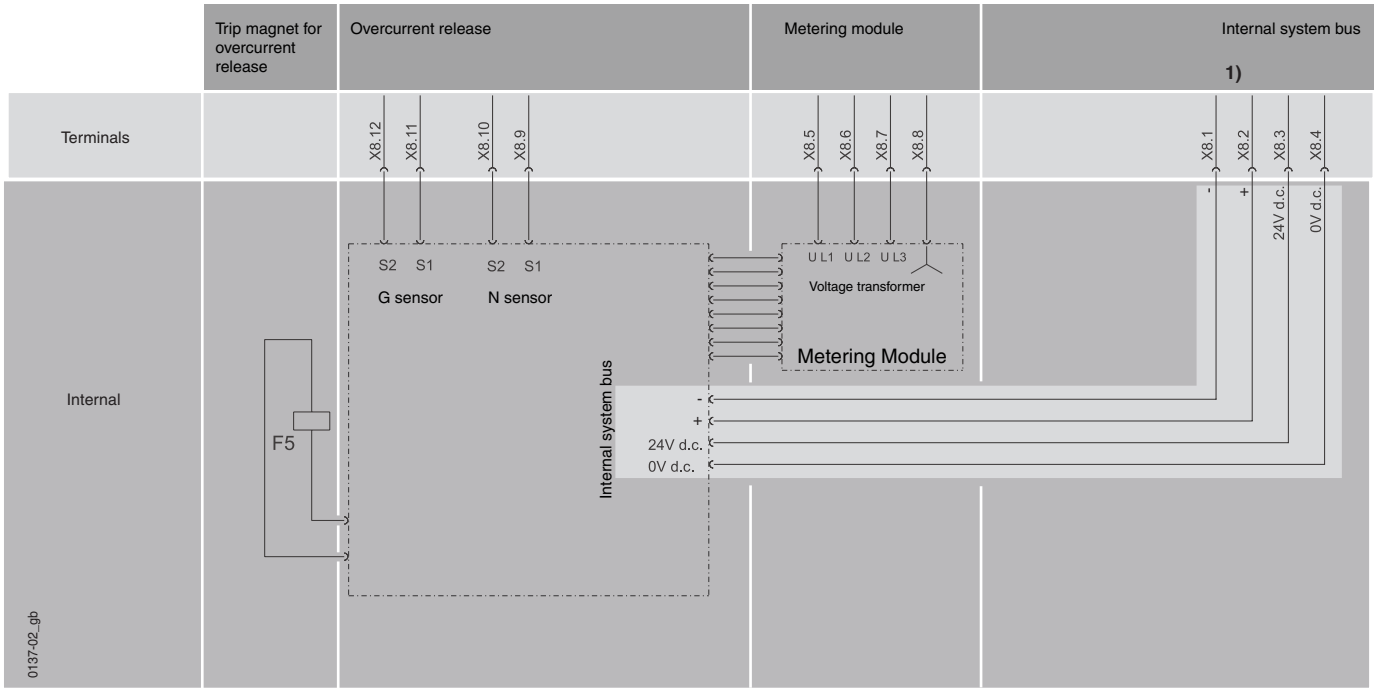
– S44 Signalling switch ON-OFF position

– S45 Trip signalling switch



*) same location as XHIS1

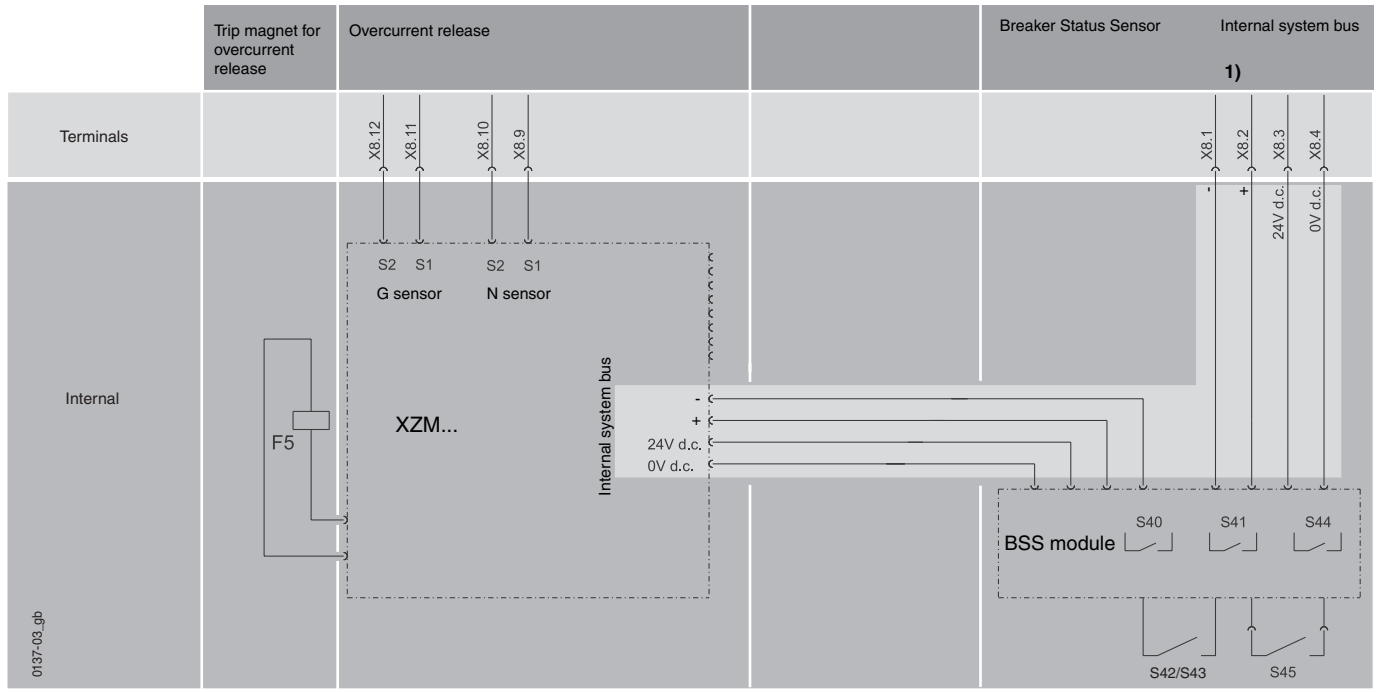
8.8.2 Only metering module XMH



1)Terminating resistor on X8-1 / X8-2, when no external systembus module.

(→ page 9 – 60)

8.8.3 Breaker Status Sensor (XBSS) only



1)Terminating resistor on X8-1 / X8-2, when no external systembus module.

(→ page 9 – 60)

9 Electronic components

Note

The contents have been checked that they conform to the hardware and software. However there could still be differences so a full guarantee of conformance cannot be given.
The details in this manual are regularly checked. Necessary corrections are contained in the next issue.

9.1 Overcurrent release

9.1.1 Overview of functions

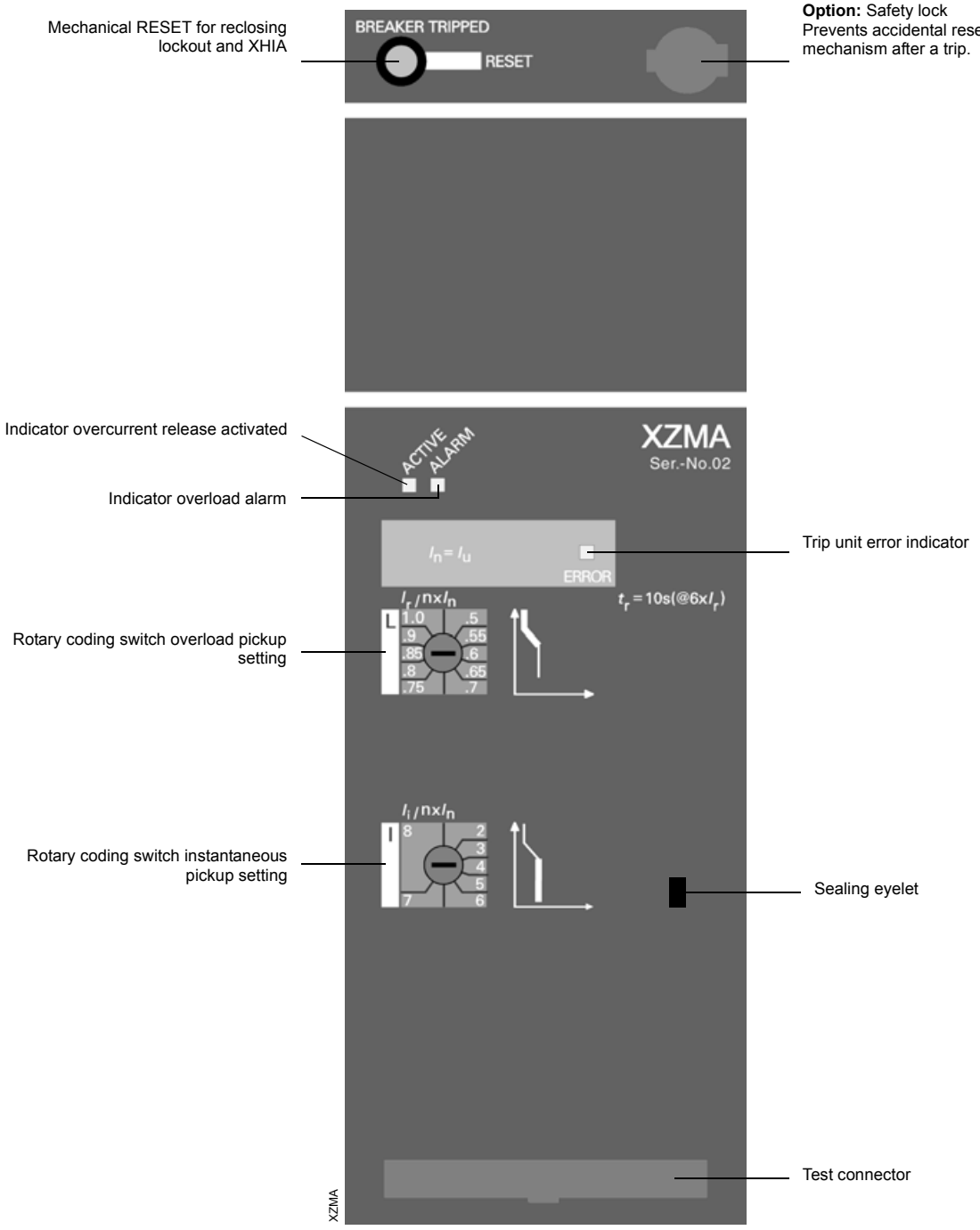
● = standard
○ = optional
1) Fixed at $I_i \geqq 20 \times I_n$, max. 50 kA
2) Increment for setting Menu/Comm

Setting range	Increment
0 – 1	0.1
1 – 100	1
100 – 500	5
500 – 1000	10
1000 – 1600	50
1600 – 10000	100
10000 – max.	1000

		IZM …-A…	**IZM …-V…**	**IZM …-U…**	**IZM…-D…**
		Trip unit for system protection	**Trip unit with selective protection**	**Releases for Universal protection**	**Digit releases**
		630 – 3200 A	630 – 6300 A	630 – 6300 A	630 – 6300 A
Basic protective functions					
Overload protection I_r	L	●	●	●	●
Adjustable delay time t_r		–	–	●	●
Short-time delayed short-circuit protection I_{sd}	S	–	●	●	●
Non-delayed short-circuit protection I_i	I	●	●[1)]	●	●
Neutral conductor protection	N	–	○	●	●
Earth-fault protection	G	–	○	○	○
Additional functions					
N-conductor protection can be switched on/off		–	○	●	●
Short-time delay short-circuit protection can be switched on/off		–	–	●	●
Instantaneous short-circuit protection can be switched on/off		–	–	●	●
Thermal memory can be switched on/off		–	–	●	●
Load monitoring		–	–	●	●
Leading signal “L-tripping” 200 ms		–	–	●	●
Short-time delayed short-circuit protection convertible to I^2t		–	–	●	●
Overload protection convertible to I^4t		–	–	●	●
Overload protection can be switched on/off		–	–	–	●
N-conductor protection adjustable		–	–	●	●
Earth fault switchable to I^2t		–	–	●	○
Earth fault alarm		–	–	○	○
Changeable parameter sets		–	–	–	●
Zone selective interlocking		–	–	○	○
Parameter definition and visualization					
Parameter definition via rotary coding switch		●	●	●	–
Parameter definition via communication (absolute values)		–	–	–	●
Parameter definition via menu (absolute values)		–	–	–	●
Remote parameter definition of the basic functions		–	–	–	●
Remote parameter definition of additional functions		–	–	●	●
Setting via parameter definition device IZM-XEM-PG or PROFIBUS-DP[2)]	**Comm**	–	–	–	●
Menu-assisted setting directly on release[2)]	**Menu**	–	–	–	●
Alphanumeric LCD		–	–	○	–
Graphic LCD		–	–	–	●
Metering function					
“Harmonic” measurement functions		–	–	○	○
Communication					
Internal system bus		–	–	●	●
PROFIBUS-DP communication		–	–	○	○
Communication via Ethernet		–	–	○	○
Other					
Connection possibility for an external 24 V DC power supply		–	–	●	●

9.1.2 Overcurrent release for system protection XZMA (IZM…-A…)

Design



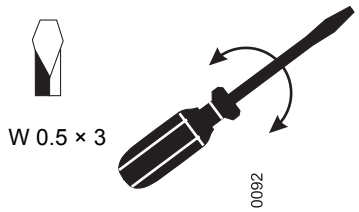
CAUTION

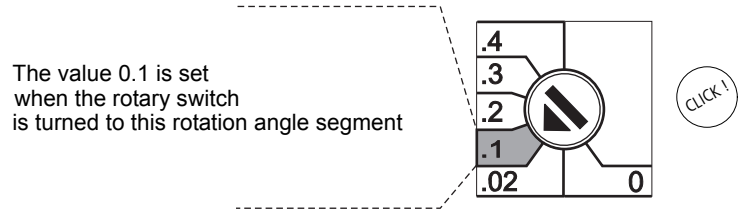
To protect the electrostatic sensitive devices (ESD) the attached protective cover must be installed on the test connector.
Before the protective cover is removed, ensure that equipment to be connected, and also operating personnel, are at the same potential.

Overcurrent protection settings

CAUTION
Adjust parameters only when the circuit-breaker is switched off. If the parameters are modified with the circuit-breaker switched on, this can trip the circuit-breaker unintentionally.
With the project engineering and selectivity considerations it must be determined that no more current could flow through the circuit-breaker than it´s switching capacity shown in the catalog. Upstream protection devices must be selected so that this fault can be safely switched off.

The parameter are set using rotary coding switches.





Protective functions

→ Overload protection – L tripping (page 9 – 16)
→ Instantaneous short-circuit tripping – I-tripping (page 9 – 17)

Characteristics

The ranges shown in the following are mere setting ranges of the respective parameters. Possible tolerance ranges have not been considered.

Note

The following characteristics each demonstrate the largest and smallest setting in the respective protective area. In order to get the complete tripping characteristic, the respective characteristic sections have been brought together. The characteristic curves indicate the behaviour of the overcurrent release when it has been activated by one of the currents flowing before the trip. If the overcurrent trip occurs directly after switch on and if the overcurrent release is not activated for this reason, the opening delay may extend by up to 15 ms depending on the level of the overcurrent. To determine the total opening time approx. 15 ms for the arc duration must to the shown opening times.

The shown characteristic curves are valid for an ambient temperature at the circuit-breaker of -5 to +55 °C. The release can be used with an ambient temperature of -20 to +70 °C (with LCD display to 55°C). For these temperatures an extended tolerance band applies.

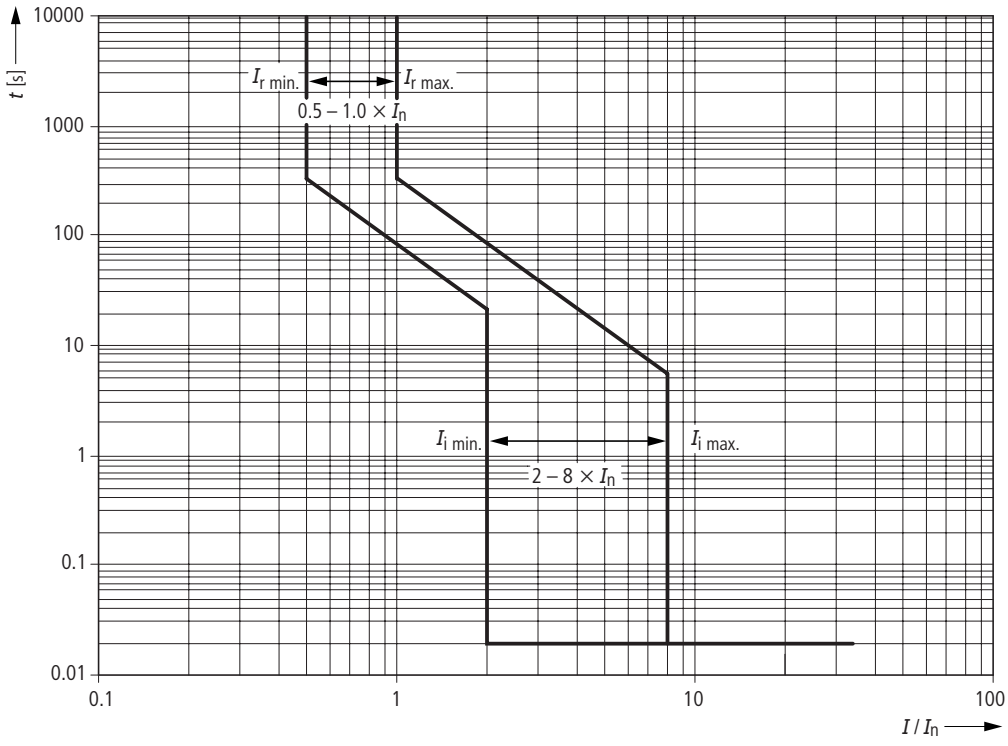
Tolerances with setting currents:

L: trip between 1.05 and 1.2 × I_r
S: -0 %, +20 %
I: -0 %, +20 %
G: -0 %, +20 %

Tolerances with tripping times:

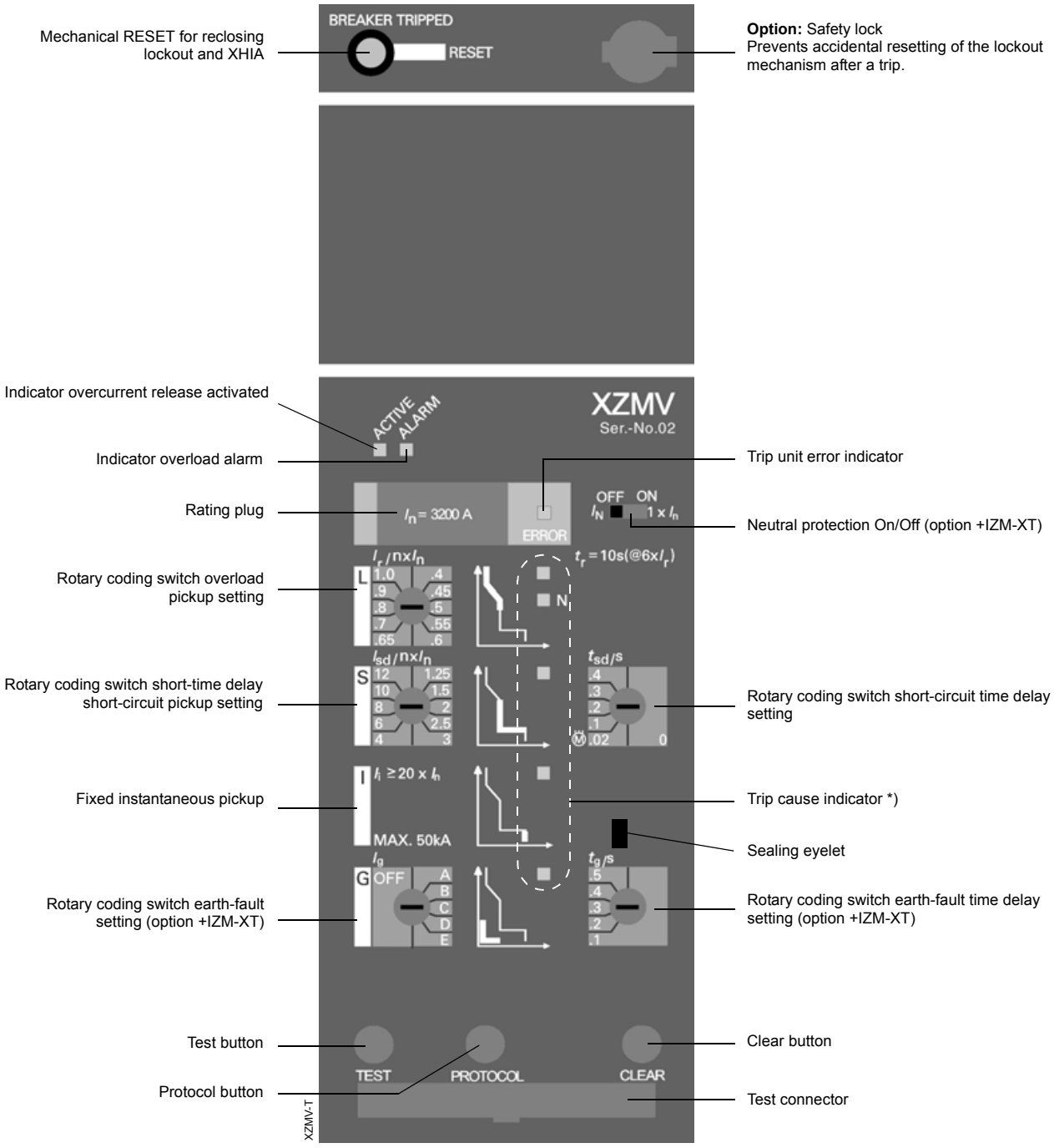
L: -20 %, +0 %
S: -0 %, +60 ms
I: < 50 ms
G: 0 ms, +60 ms

L-, I-trip



9.1.3 Overcurrent release with selective protection XZMV (IZM…-V…)

Design



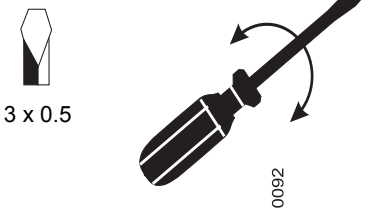
1)The reason for tripping is stored for a minimum of two days when the overcurrent release is activated for at least 10 mins before the trip occurred.

CAUTION
To protect the electrostatic sensitive devices (ESD) the attached protective cover must be installed on the test connector. Before the protective cover is removed, ensure that equipment to be connected, and also operating personnel, are at the same potential.

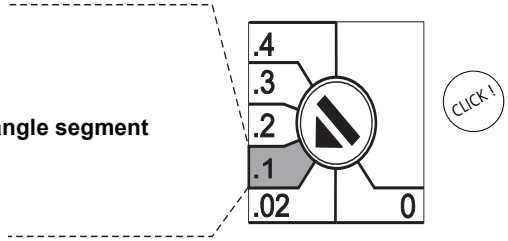
Overcurrent protection settings

CAUTION
Adjust parameters only when the circuit-breaker is switched off. If the parameters are modified with the circuit-breaker switched on, this can trip the circuit-breaker unintentionally.
With the project engineering and selectivity considerations it must be determined that no more current could flow through the circuit-breaker than it´s switching capacity shown in the catalog. Upstream protection devices must be selected so that this fault can be safely switched off.

The parameters for the basic functions are adjusted with rotary coding switches.



The value 0.1 is set
when the rotary switch
is turned to this **rotation angle segment**



The neutral conductor protection is switched on/off with a slide switch.

Protective functions

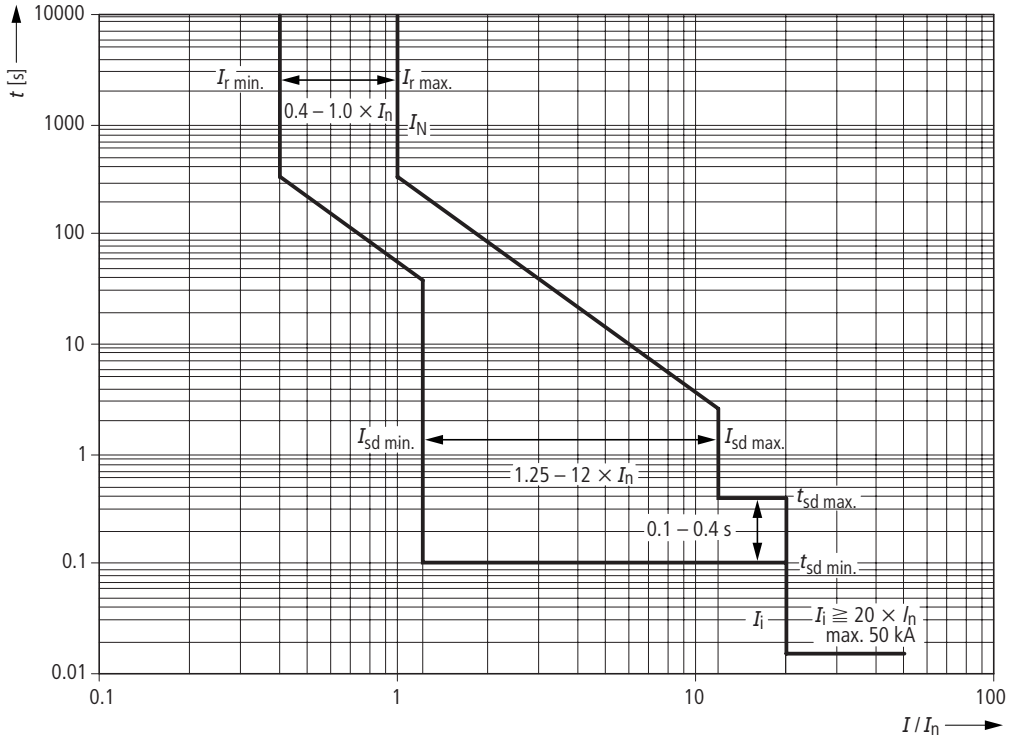
→ Overload protection – L tripping (page 9 – 16)
→ Short-time delayed short-circuit tripping – S-tripping (page 9 – 16)
→ Instantaneous short-circuit tripping – I-tripping (page 9 – 17)
→ Earth-fault tripping – G-tripping (page 9 – 17)
→ Neutral conductor protection – N-tripping (page 9 – 17)

Characteristics

The ranges shown in the following are mere setting ranges of the respective parameters. Possible tolerance ranges have not been considered.

Further information about the characteritic curves page 9 – 4

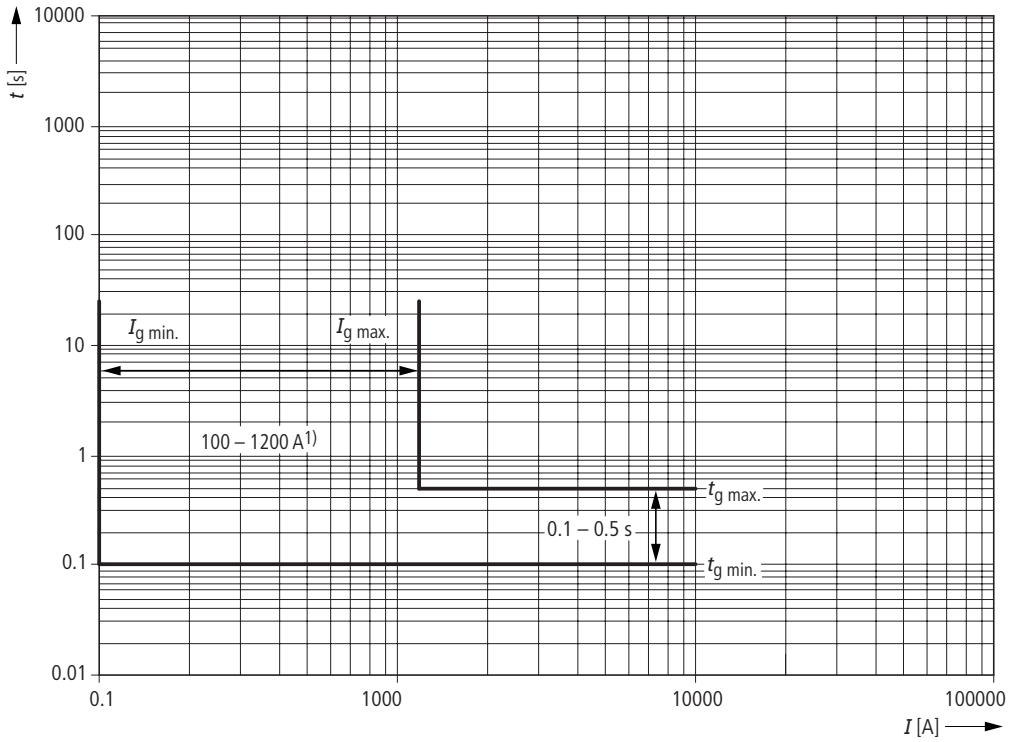
L-, S-, I-, N-tripping



Earth-fault tripping

G tripping

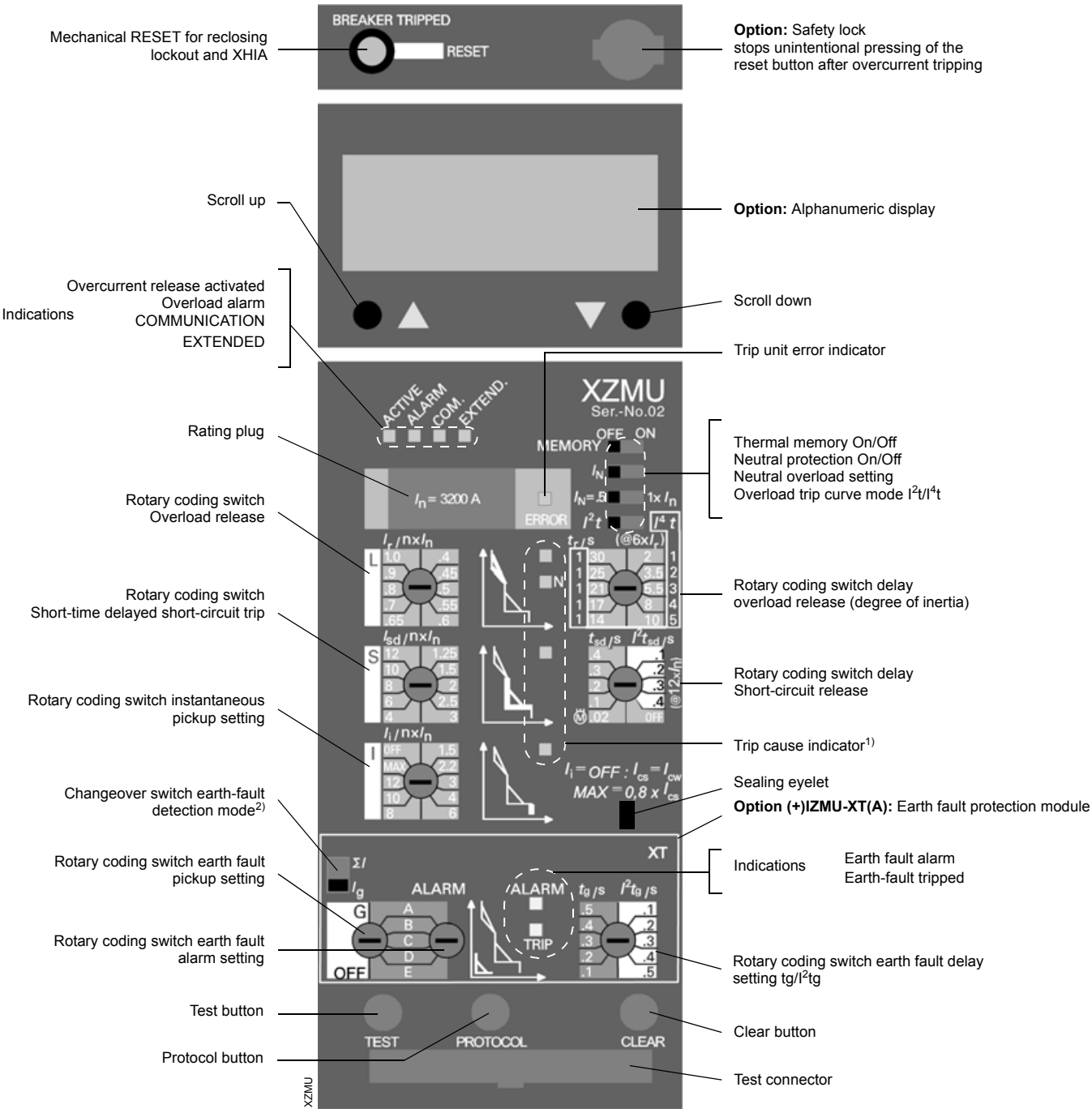
Option +IZM-XT



1) IZM.1-…/IZM.2-…: 100 … 1200 A
IZM.3-… 400 … 1200 A

9.1.4 Overcurrent release for universal protection XZMU (IZM…-U…)

Design



1) The trip cause is stored internally for at least two days, if the overcurrent release had been activated for at least 10 min before tripping (For unlimited time with auxiliary power).

2) Changeover only accessable when module removed.

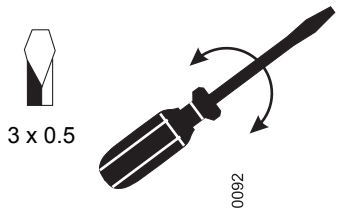
CAUTION

Please observe the notes page 9 – 46!
To protect the electrostatic sensitive devices (ESD) the attached protective cover must be installed on the test connector.
Before the protective cover is removed, ensure that equipment to be connected, and also operating personnel, are at the same potential.

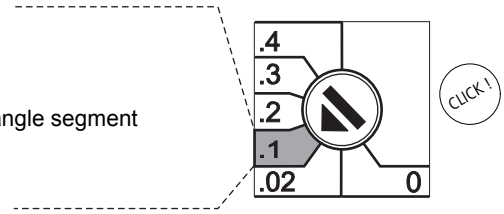
Overcurrent protection settings

CAUTION
Adjust parameters only when the circuit-breaker is switched off. If the parameters are modified with the circuit-breaker switched on, this can trip the circuit-breaker unintentionally.
With the project engineering and selectivity considerations it must be determined that no more current could flow through the circuit-breaker than it´s switching capacity shown in the catalog. Upstream protection devices must be selected so that this fault can be safely switched off.

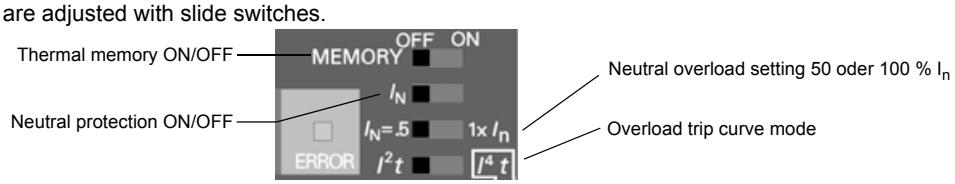
The parameters for the basic functions are adjusted with rotary coding switches.



The value 0.1 is set
when the rotary switch
is turned to this rotation angle segment



Various additional functions are adjusted with slide switches.



The settings for the additional function “load monitoring” can be adjusted through:

– the alphanumeric display (→ page 9 – 20)
– the test socket with the parameter assignment module XEM-PG(E) (→ page 9 – 74)
– the PROFIBUS-DP with a PC and the system-software (→ “Communication manual circuit-breaker IZM”)

Note
These settings can only be adjusted if the overcurrent release is activated, i.e. it must be connected to an external 24 V DC voltage supply.

Protective functions

→ Overload protection – L tripping (page 9 – 16)
→ Short-time delayed short-circuit tripping – S-tripping (page 9 – 16)
→ Instantaneous short-circuit tripping – I-tripping (page 9 – 17)
→ Earth-fault tripping – G-tripping (page 9 – 17)
→ Neutral conductor protection – N-tripping (page 9 – 17)
→ Load monitoring (“Load restore/load shedding”) (page 9 – 18)
→ Leading signal “L-tripping” (page 9 – 18)
→ Thermal memory can be switched on/off (page 9 – 18)
→ Earth-fault protection modules (page 9 – 36)
→ Further protection functions (page 9 – 15)

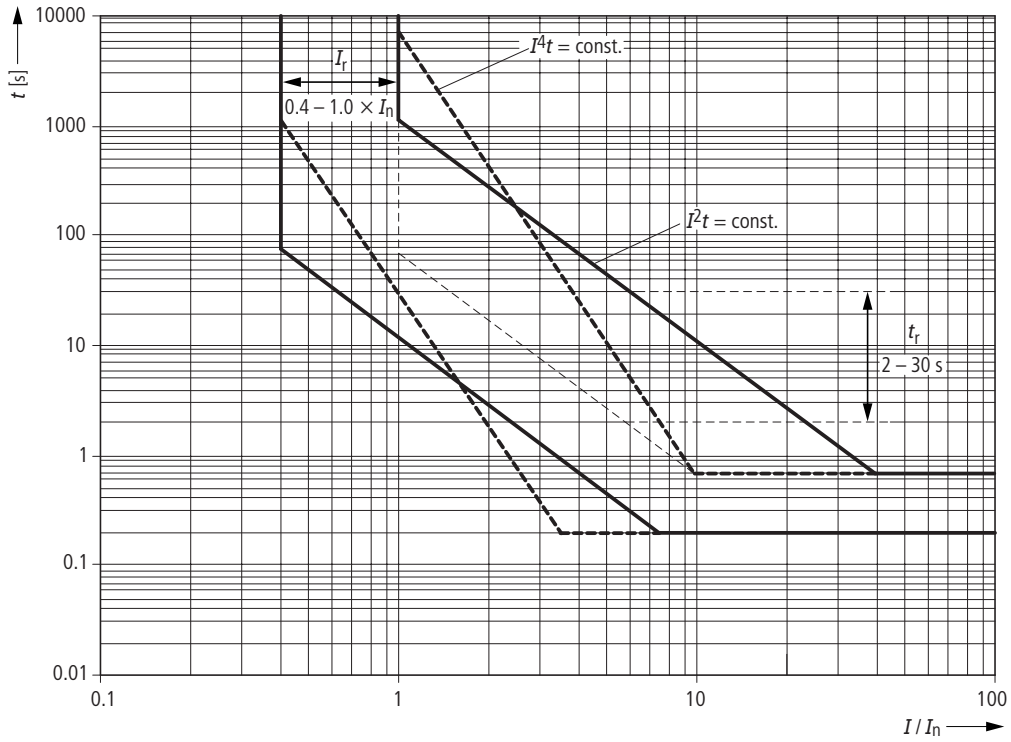
Characteristics

The ranges shown in the following are mere setting ranges of the respective parameters. Possible tolerance ranges have not been considered.

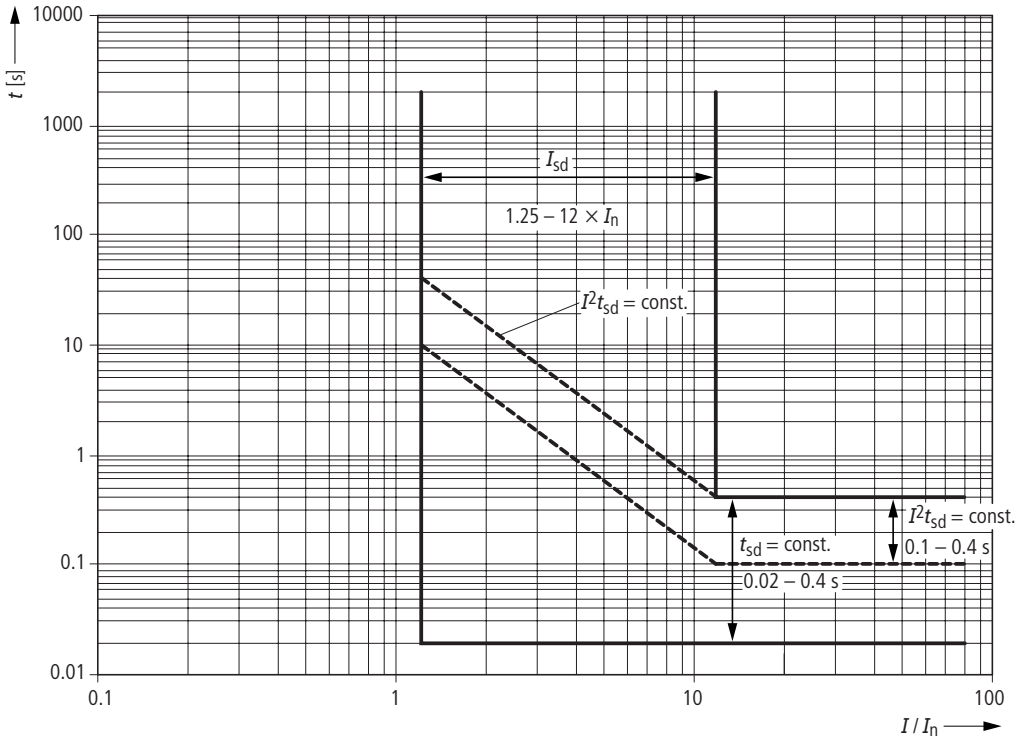
The characteristics apply to the circuit-breaker version IZM…2-…, H-class, at 440 V, with earth-fault protection module.

Further information about the characteritic curves page 9 – 4

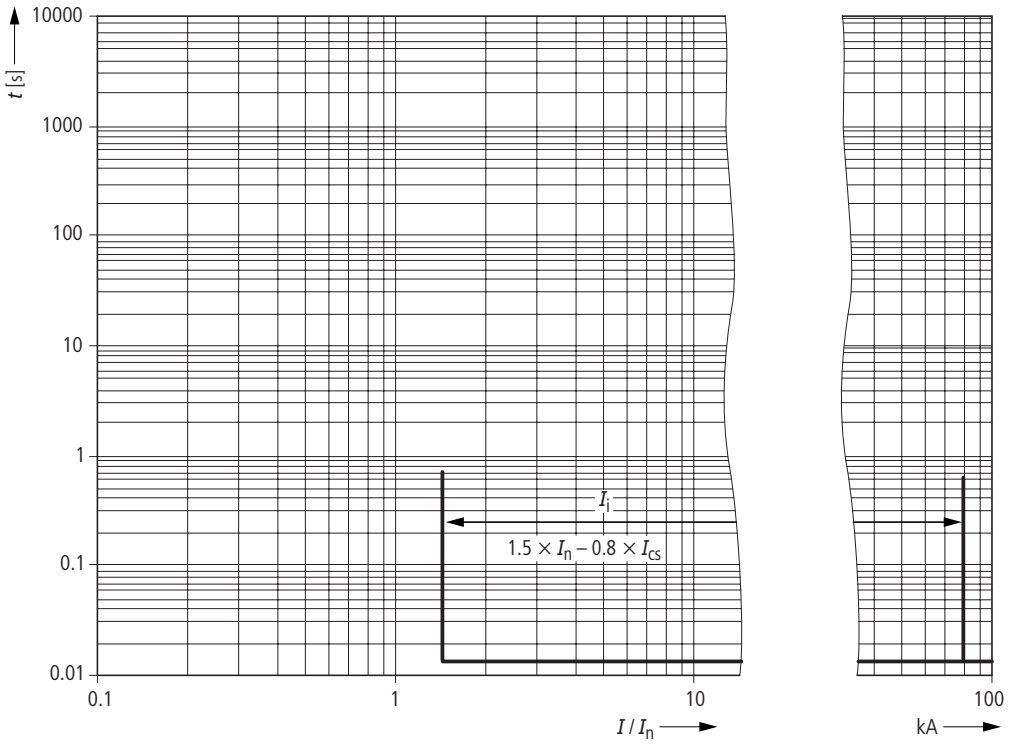
L-trip



S-trip



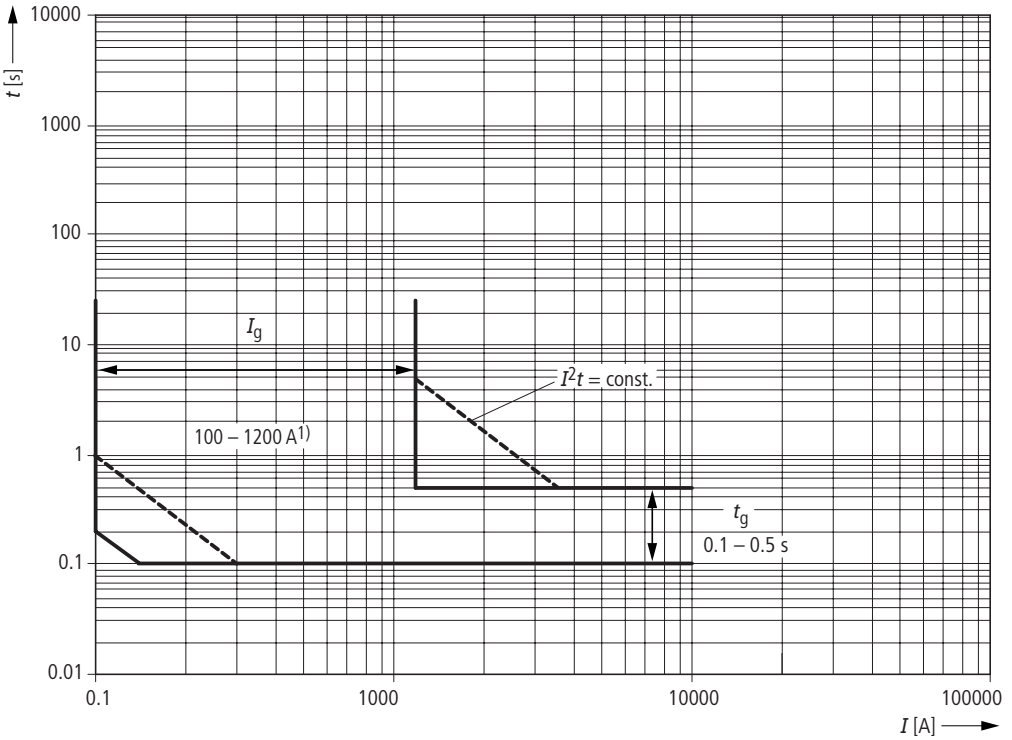
I-trip



Earth-fault trip

G tripping

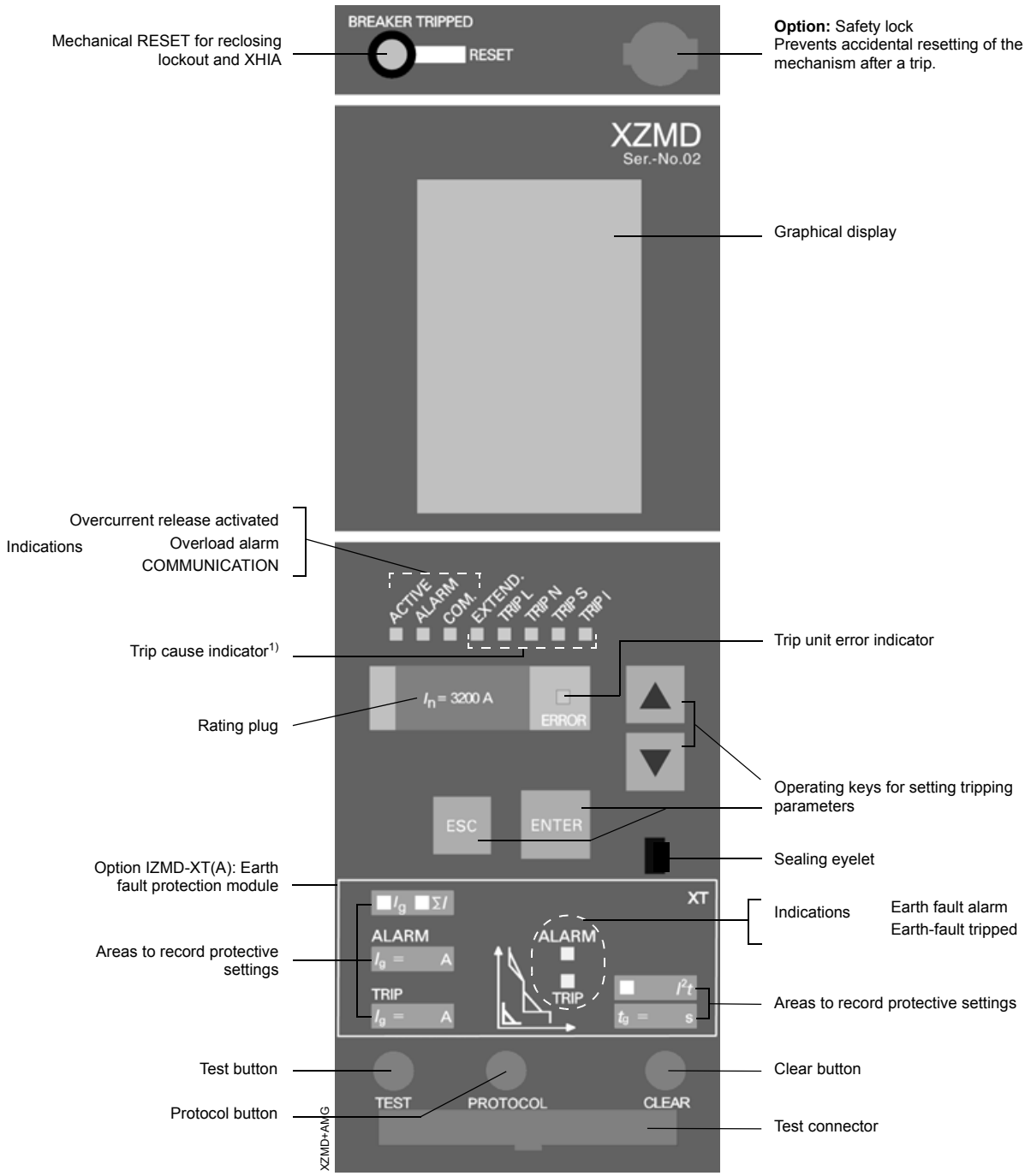
Option (+)IZMU-XT(A)



1) IZM.1-…/IZM.2-…: 100 … 1200 A
IZM.3-… 400 … 1200 A

9.1.5 Digital release XZMD (IZM…-D…)

Design



1) The trip cause is stored internally for at least two days, if the overcurrent release had been activated for at least 10 min before tripping (For unlimited time with auxiliary power).

CAUTION

Please observe the notes page 9 – 46!
To protect the electrostatic sensitive devices (ESD) the attached protective cover must be installed on the test connector.
Before the protective cover is removed, ensure that equipment to be connected, and also operating personnel, are at the same potential.

Overcurrent protection settings

CAUTION
Adjust parameters only when the circuit-breaker is switched off. If the parameters are modified with the circuit-breaker switched on, this can trip the circuit-breaker unintentionally.
With the project engineering and selectivity considerations it must be determined that no more current could flow through the circuit-breaker than it´s switching capacity shown in the catalog. Upstream protection devices must be selected so that this fault can be safely switched off.
When switching off the overload function it must be ensured that no overload can occur. A thermal destruction of the circuit-breaker, the system or the load could be the consequence. Occurring overloads can only be switched off in this case by tripping by exceeding the response value of the short-circuit protection function (delayed or undelayed). These response values are to be correspondingly adjusted.

Note

It is also possible during operation with XZMD to switch between parameter set A and parameter set B and vice versa.

After the switchover signal from the systembus the switchover takes 100 ms for the short-circuit parameters and 200 ms for the overload overload parameters.

All parameters for the basic and the additional functions can be adjusted through:

– the graphical display (→ page 9 – 27)
– the test socket with the parameter assignment module XEM-PG(E) (→ page 9 – 74)
– the PROFIBUS-DP with a PC and the system-software (→ “Communication manual circuit-breaker IZM”)

Note

To do this, the overcurrent release must be activated, i.e. it must be connected to an external 24 V DC voltage supply.

Protective functions

→ Overload protection – L tripping (page 9 – 16)
→ Short-time delayed short-circuit tripping – S-tripping (page 9 – 16)
→ Instantaneous short-circuit tripping – I-tripping (page 9 – 17)
→ Earth-fault tripping – G-tripping (page 9 – 17)
→ Neutral conductor protection – N-tripping (page 9 – 17)
→ Load monitoring (“Load restore/load shedding”) (page 9 – 18)
→ Leading signal “L-tripping” (page 9 – 18)
→ Thermal memory can be switched on/off (page 9 – 18)
→ Earth-fault protection modules (page 9 – 36)
→ Further protection functions (page 9 – 15)

Characteristics

The ranges shown in the following are mere setting ranges of the respective parameters. Possible tolerance ranges have not been considered.

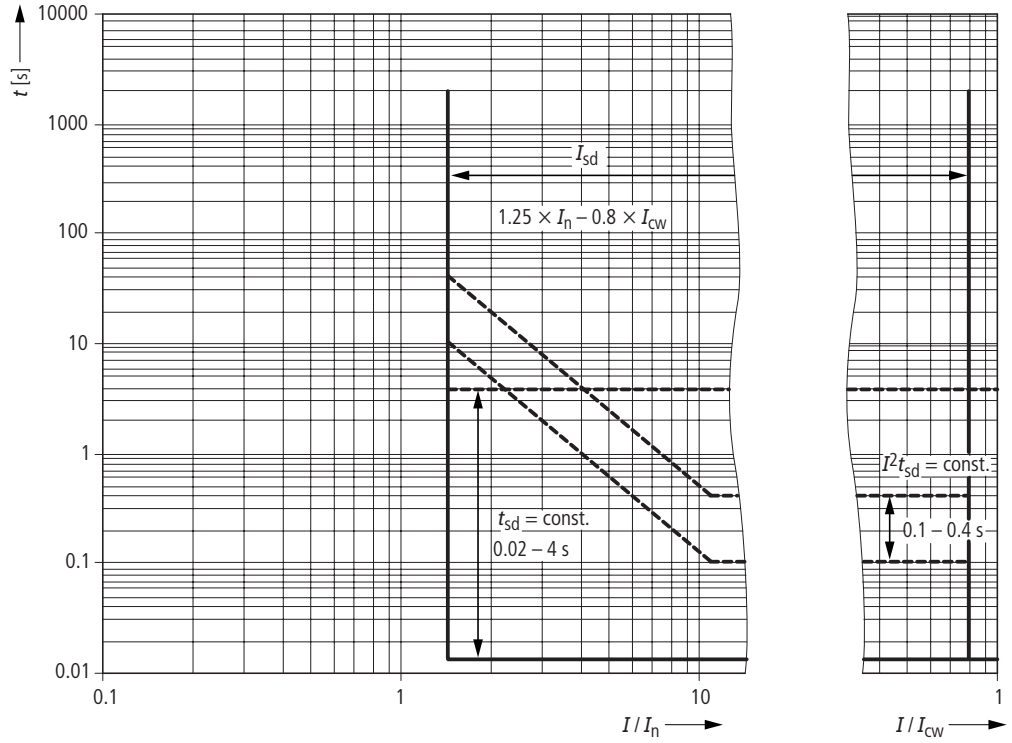
The characteristics apply to the circuit-breaker version IZM…2-…, H-class, at 440 V, with earth-fault protection module.

Further information about the characteritic curves page 9 – 4

L-trip

(→ page 9 – 10)

S-trip



Note

For setting tsd > 0.4 s the maximum possible setting value Isd is reduced automatically with the frame size:
IZM.1-… : 15 kA
IZM.2-… : 20 kA
IZM.3-… : 25 kA

I-trip

(→ page 9 – 11)

Earth-fault tripping

(→ page 9 – 11)

9.1.6 Order numbers

Overcurrent release	Part no.
System protection	IZM-XZMA
Selectivity protection	IZM-XZMV
Selectivity protection with earth-fault protection	IZM-XZMV-XT
Universal	IZM-XZMU
Universal with measuring function “harmonic”	IZM-XZMU-MH
Digital	IZM-XZMD
Digital with measuring function “harmonic”	IZM-XZMD-MH

9.1.7 Indications

Scope of indications depends on the type of overcurrent release.

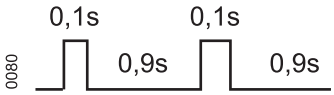
Overcurrent release is activated

$I > I_{min}$

– or when 24 V control voltage is connected

– I_{min}:
60 A for IZM.1-… and IZM.2-…, 150 A for IZM.3-…

Flashing LED



Overcurrent alarm

$I \geqq I_r$

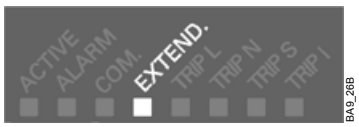
– Steady LED, if

Communication active

– Another participant on the internal systembus is recognised and communication started.

Extended protective function has tripped

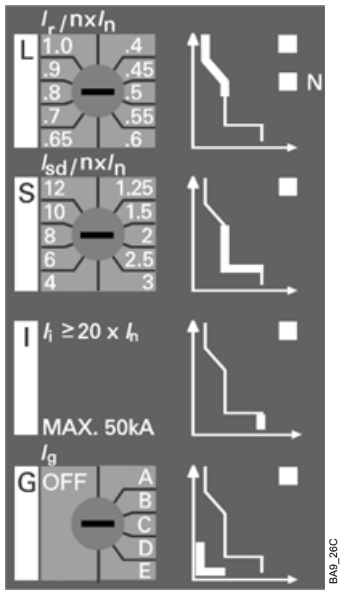
– Due to metering function
– Trip cause saved in event memory
– Trip cause readable through:
  • Parameter determination device XEM-PG(E)
  • PROFIBUS-DP and PC with system-software
  • Graphical display (XZMD)
  • External digital output module (→ page 9 – 54)



Protection function has tripped (overcurrent)

– Indicator is illuminated, if protocol button is pressed
– Only one trip cause is displayed
– Only the last trip cause is displayed

or



LED ERROR

1. Error flashes:

Protection function is restricted. The protection parameters are reset to the minimum value.

Causes:

– The rated current of the rated current module is larger than that of the circuit-breaker.
– Rotary coding switch is in an undefined intermediate position
– Overcurrent release is defective

2. Error shows continously:

Protection function is not guaranteed.

Causes:

– Rated current module and circuit-breaker are not compatible.
– Overcurrent release is defective

9.1.8 Protective functions

9.1.8.1 Basic protective functions

The basic protective functions of the overcurrent release are ensured without additional auxiliary voltage. The required power is supplied by internal transformers of the circuit-breaker.

To evaluate the currents, the electronic system of the overcurrent release calculates the r.m.s. value.

The individual functions are parameterized according to the part no. through:

- Rotary coding switch (XZMA, XZMV, XZMU)
- Electronic data transfer (XZMD) through:
  - The test socket with the parameter assignment module XEM-PG(E)
  - The PROFIBUS-DP with a PC and the system-software
- Control board (XZMD)

Overload protection – L tripping

The setting value I_r determines the maximum continous current the circuit-breaker can carry without tripping. The time-lag t_r determines the duration of an overload without tripping.

Current settings for I_r	
XZMA	I_r = (0.5/0.6/0.7/0.8/0.9/1.0) x I_n
XZMV, XZMU	I_r = (0.4/0.45/0.5/0.55/0.6/0.65/0.7/0.8/ 0.9/1.0) x I_n
XZMD	I_r = (0.4 ... 1.0) x I_n (data in Amps)

Setting for t_r	
XZMA, XZMV	t_r = 10 s (at 6 x I_r)
XZMU	t_r = 2/3.5/5.5/8/10/14/17/21/25/30 s (at 6 x I_r)
XZMD	t_r = 2 … 30 s (at 6 x I_r)

The tripping characteristic is an I^2t-characteristic. Some overcurrent releases can be switched over to an I^4t-characteristic (→ page 9 – 19).

Short-time delayed short-circuit tripping – S-tripping

On overcurrent releases XZMV, XZMU and XZMD, tripping due to the short-circuit current Isd can be delayed by the time tsd.

This provides selectivity for the short-circuit protection in switchgear with several grading levels.

Setting values for I_{sd}	
XZMV, XZMU	I_{sd} = (1.25/1.5/2/2.5/3/4/6/8/10/12) x I_n
XZMD	I_{sd} = 1.25 x I_n … 0.8 x I_{CW} (data in A)

Setting values for t_{sd}	
XZMV	t_{sd} = 0/0.02(M)1)/0.1/0.2/0.3/0.4 s
XZMU	t_{sd} = 0.02(M)1)/0.1/0.2/0.3/0.4 s; OFF
XZMD	t_{sd} = 0.02(M)1)/0.08 … 4 s 2) ; OFF

1) The delay time 0.02 s is not a selected delay time!
In this position, the motor protection function is activated.

2) For setting tsd > 0.4 s the maximum possible setting value Isd is reduced automatically with the frame size:
IZM.1-… : 15 kA
IZM.2-… : 20 kA
IZM.3-… : 25 kA

With the setting t_{sd} = 0 s the overcurrent release XZMV can provide an instantaneous short-circuit protection with an adjustable value that is smaller than the fixed set value. I_i .

The setting “OFF” for the overcurrent releases XZMU and XZMD is provided to deactivate the short-time delay short-circuit protection.

If the zone selective (→ page 9 – 19) is used, however, the setting for the time delay tsd is deactivated. If the circuit-breaker does not receive any blocking signal from a downstream circuit-breaker, it will trip after 50 ms regardless of the setting for t_{sd}.

Some overcurrent releases can be switched over to an I^2t-characteristic (→ page 9 – 19).

Motor protection function

With the switch position t_{sd} = (0.02 s) a special protection function for electromotive drives is switched on. It inhibits the activation of the short-time delayed short-circuit release by the switch-on peaks of electric motors. At the same time, a phase failure protection is activated (→ page 9 – 18) and the time constant for the internally calculated reproduction of the temperature-rise and cooling process is switched over from switchgear protection to motor protection.

Instantaneous short-circuit tripping – I-tripping

If the current setting I_i is exceeded, the circuit-breaker is tripped instantaneously.

Settings for I_i	
XZMA	I_i = (2/3/4/5/6/7/8) x I_n
XZMV	$I_i \geqq 20 \times I_n$ (fixed setting) MAX = 50 kA
XZMU	OFF 1) I_i = (1,5/2,2/3/4/6/8/10/12) × I_n MAX = 0.8 x I_{CS}
XZMD	I_i = 1.5 x In … 0.8 x I_{CS} ; OFF 1) (data in Amps) MAX = 100 kA

1) If the I trip is switched off the breaking capacity of the circuit-breaker is reduced to $I_{CS} = I_{CW}$.

Correspondingly the t_{sd}-setting is the I_{CW} value to be adjusted for 0.5 ... 4 sec

For the overcurrent releases XZMU and XZMD it is not possible to deactivate the short-time delay short-circuit protection, setting tsd = OFF, and the instantaneous short-circuit protection Ii = OFF at the same time! Should by t_{sd} = OFF the setting I_i = OFF be selected, an automatic internal correction takes place to I_i = 1.5 x I_n.

Earth-fault tripping – G-tripping

If the overcurrent release is equipped with an earth-fault protection module, loads can be protected against unpermissibly high earth-fault currents.

The earth-fault release “G” detects fault currents which flow to earth and which can cause a fire in the power distribution system. The adjustable delay time allows multiple circuit-breakers to be connected in series with providing graded selectivity.

For the overcurrent release XZMV with option +IZM-XT the earth-fault protection is integrated fixed, whereas the overcurrent release XZM(U)(D) can be equipped with an earth-fault protection module (→ page 9 – 36) even later on.

Vectorial current summation (XZMV, XZMU, XZMD):
The N conductor current is measured directly and is evaluated for the N conductor overload protection. Using the vectorial current summation of the three phase currents and the N-conductor current, the overcurrent release calculates the earth-fault current.

This method of measurement is suitable for symetrical loads on the main conductors.

Direct measurement of the earth-fault current (XZMU, XZMD):
A current transformer with a ratio of 1200 A/1 A is used for measurement of the earth-fault current. The current transformer can be directly mounted in the earthed star point of the transformer. (→ page 9 – 72)

The response value I_g together with the setting of the time delay t_g determines the shut off of the earth-fault.

Settings for I_g		
	Frame size	
	IZM.1-…/IZM.2-…	IZM.3-…
A	100 A	400 A
B	300 A	600 A
C	600 A	800 A
D	900 A	1000 A
E	1200 A	1200 A
OFF		

Current settings for t_g	
XZMV, XZMU	t_g = 0.1/0.2/0.3/0.4/0.5 s
XZMD	t_g = 0.1…0.5 s

Some overcurrent releases can be switched over to an I^2t-characteristic .(→ page 9 – 19)

Neutral conductor protection – N-tripping

The overcurrent releases XZMV, XZMU and XZMD offer the possibility to protect the neutral conductor against overload, too. This requires a current transformer for the neutral conductor, which can be retrofitted (→ page 9 – 69).

For tripping, the same time-lag class t_r applies as for overload tripping.

Settings for I_N	
XZMV	$I_N = I_n$; OFF
XZMU	I_N = (0.5/1.0) x I_n; OFF
XZMD	I_N = (0.2…2.01)) x I_n; OFF

1) Current settings above 1.0 × In are only available for 3-pole circuit-breakers. The N conductor current is monitored by an external current transformer.

	CAUTION
⚠	Setting $I_N > 1 \times I_n$ may be used only, if the N-conductor has been designed to carry this current!

9.1.8.2 Additional functions

Load monitoring (“Load restore/load shedding”)

The overcurrent releases XZMU and XZMD offer the possibility of additional load monitoring. Two current values, “load shed” and “load restore”, and one time delay t_x can be set.

When the current falls below the set value of the “load restore” and at the same time exceeds the lowest value of current transfer, after the set time delay t_x a signal is generated through the internal system bus. Also when the set value “load shedding” is exceeded, after the set time delay t_x a signal is generated through the internal system bus. These signals can be used to connect or disconnect loads. Therefore overload tripping of incoming circuit-breakers for example can be avoided.

Settings for load monitoring	
“Load shed” and “load restore”	40 A…1.5 x I_r; OFF
Delay time	t_x = 1…15 s

Load monitoring can be adjusted through:

– The alphanumeric display (XZMU)
– The graphical display (XZMD)
– The test socket with the parameter assignment module XEM-PG(E)
– The PROFIBUS-DP with a PC and the system-software

The signals “load restore/load shedding” can be further processed via an expansion module IZM-XEM-6(P)DO-… or the PROFIBUS interface.

Leading signal “L-tripping”

The overcurrent releases XZMU and XZMD provide a leading signal “L-tripping”, which is transmitted through the internal system bus 100 ms before overload tripping. Using this thyristor control devices for example can be actuated.

The leading signal “L-tripping” can be further processed via an expansion module IZM-XEM-6(P)DO-… or the PROFIBUS interface.

Phase failure protection

In overcurrent release XZMD, the phase failure protection can also be activated if the motor protection is not activated.

If when phase failure protection is activated the current of the lowest loaded phase is 50% smaller than the current of the highest loaded phase the set value I_r is automatically reduced to 80%. When the phase currents differ by less than 50% the set value I_r is again valid.

Thermal memory can be switched on/off

The overcurrent releases XZMU and XZMD offer the possibility to continue with the internally calculated reproduction of the thermal processes in downstream switchgear and consumers even if the circuit-breaker is open and the electronic system has no external supply. In this way, an effective protection against thermal overload can be guaranteed for frequent closing and opening processes, too.

Behaviour in overload range:

– above 1.125 x I_R occurs a strict linear heating to the characteristic curve.

Behaviour in rated current range:

– below 1.125 x I_R there is no heating

– an exponential cooling takes places with a time constant of 18 x t_R for system protection or 10 x t_R for motor protection

Behaviour with MEMORY = ON:

When the thermal memory is switched on the thermal history is taken into consideration :

– after a trip the thermal memory of the phases is set to 90% equivalent of the warmest phase. (allows re-switch on)

– an exponential cooling with a time constant of 18 x t_R for system protection or 10 x t_R for motor protection

With self-provided tripping the phase of deactivating the cooling with reactivation is software produced for a range of up to 60 mins so that for external and self-provided releases have relatively similar tripping times.

Behaviour with MEMORY = OFF:

When the thermal memory is switched off the thermal history is not taken into consideration :

– The thermal memory of the release always starts at ZERO when activated.

– after tripping the thermal memory of the phases is set to ZERO

The thermal memory can be activated through:

– A slide switch (XZMU)

– The graphical display (XZMD)
– The test socket with the parameter assignment module XEM-PG(E) (XZMD)
– The PROFIBUS-DP with a PC and the system-software (XZMD).

Zone selective interlocking

If the circuit-breaker is combined with a ZSI-module ,(→ page 9 – 62) a short-circuit occurring in systems with several grading levels can be localised precisely.

For this purpose, all circuit-breakers are interconnected through their ZSI-modules.

In case of short-circuit, each circuit-breaker affected by the short-circuit current interrogates its downstream circuit-breaker to determine fault presence at this downstream level. In the direction of the energy flow, only the circuit-breaker nearest to the short-circuit trips. A possible time delay setting for the short-circuit tripping is deactivated. However, tripping will not take place until 50 ms later at the earliest, as a rule it will take 80 –90 ms.

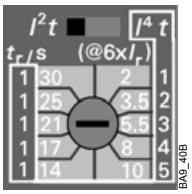
Overload protection can be set I^4t

The overcurrent releases XZMU and XZMD offer the possibility to switch over from the I^2t to an I^4t inverse-time function for the overload protection by means of a slide switch. This improves the selectivity of the overload protection in combination with fuses.

This function is only effective for a set overload current in the range of 320 A ≦ I_r ≦ 2500 A.

In this case, the setting possibilities for the time-lag class t_r change as follows (values in the white frame):

Setting for tr	
XZMU	t_r = 1/2/3/4/5 s (at 6 x I_r)
XZMD	t_r = 1… 5 s (at 6 x I_r)



Switching off overload protection

On overcurrent release XZMD it is possible to switch off the overload protection. This might be necessary e.g. if the system is fed by a generator.

Switching off can be effected through:

– The graphical display (XZMD)
– The test socket with the parameter assignment module XEM-PG(E)
– The PROFIBUS-DP with a PC and the system-software

CAUTION

When switching off the overload function it must be ensured that no overload can occur.
A thermal destruction of the circuit-breaker, the system or the load could be the consequence.
Occurring overloads can only be switched off in this case by tripping by exceeding the response value of the short-circuit protection function (delayed or undelayed). These response values are to be correspondingly adjusted.

Short-time delay short-circuit protection switchable to I^2t

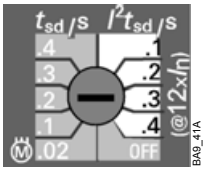
The overcurrent releases XZMU and XZMD offer the possibility to switch over from a constant delay time to a I^2t characteristic. In this way, the time delay depends on the short-circuit current, but with a constant I^2t_{sd}-value, providing a better selectivity with downstream fuses.

In this case, the setting possibilities for the time-lag class change as follows:

Setting values for tsd	
XZMU, XZMD	t_{sd} = 0.1/0.2/0.3/0.4 s (at 12 x I_n)

Switchover to the I^2t_{sd}-characteristic can be made through:

– The t_{sd} rotary coding switch (XZMU), which must be set to a value in the white area.



– The graphical display (XZMD)
– The test socket with the parameter assignment module XEM-PG(E) (XZMD)
– The PROFIBUS-DP with a PC and the system-software (XZMD).

Changeable parameter sets

The overcurrent release XZMD enables the storage of two different parameter sets for protective functions.

This enables changeover to new protection settings whenever there is a transfer to another supply source.

Switchover can be made manually through:

– The graphical display (XZMD)
– The test socket with the parameter assignment module XEM-PG(E)
– The PROFIBUS-DP with a PC and the system-software

Or automatically through:

– The PROFIBUS-DP
– The internal system bus with an input signal at the digital input module

Earth-fault protection switchable to I^2t-characteristic

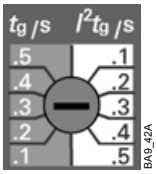
The earth fault module XZMU and XZMD offer the possibility to switch over from a constant delay time to a I^2t characteristic.

This provides an inverse-time tripping characteristic with a constant I^2t_g-value, providing better selectivity of the earth-fault protection in systems with several grading levels.

The setting possibilities for the time delay remain unchanged.

Switchover to the I2tg-characteristic can be made through:

– The tg rotary coding switch (XZMU), which must be set to a value in the white area.



– The graphical display (XZMD)
– The test socket with the parameter assignment module XEM-PG(E) (XZMD)
– The PROFIBUS-DP with a PC and the system-software (XZMD).

Earth fault alarm

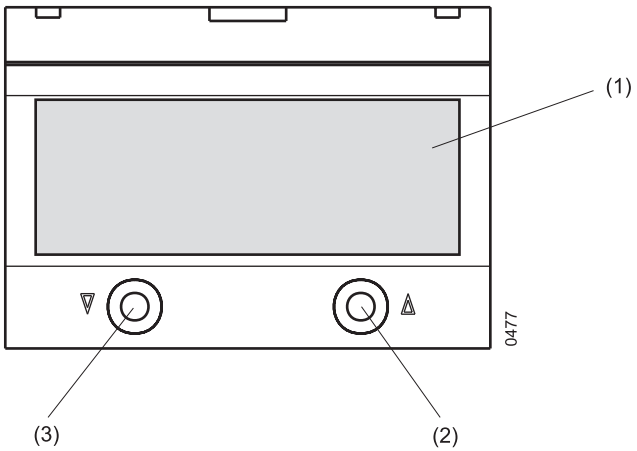
→ Earth-fault protection modules (page 9 – 36)

9.1.9 Displays

9.1.9.1 Alphanumeric display

The alphanumeric display is available as an option for the universal overcurrent release XZMU.

Design



(1) Screen (4 lines with 20 characters each)
(2) Up-key
(3) Down-key

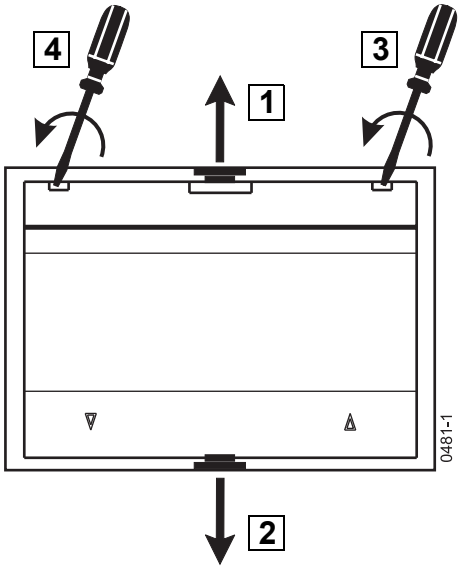
Retrofitting

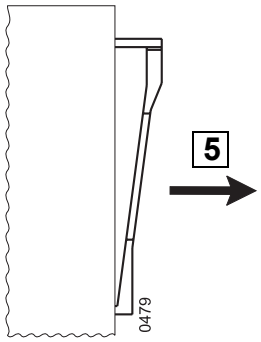
The overcurrent release XZMU, can be retrofitted with an alphanumeric display.

	Danger
	**Hazardous voltage!** **Can cause death or serious personal injury as well as damage to device and equipment.** Before working on this device the system must be switched off.

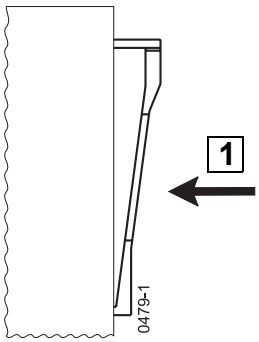
– Switching off and discharging the spring(→ page 24 – 2)
– Switch off external 24 V DC voltage supply, if applicable
– Remove sealing cap of overcurrent release, if applicable (→ page 9 – 45)

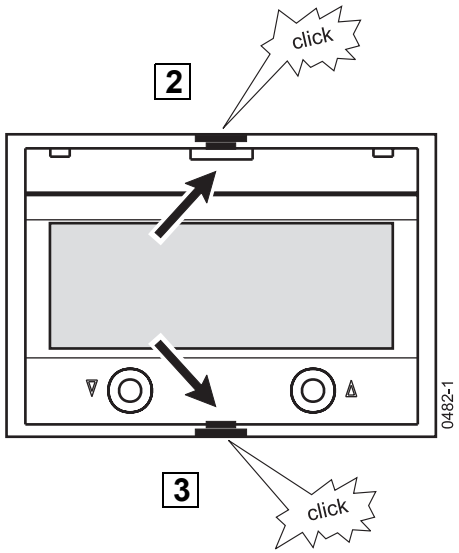
Removing dummy flange





Installing display and latching it tight





– Install and seal sealing cap of overcurrent release, if applicable, (→ page 9 – 45)
– Switch on external 24 V DC voltage supply, if applicable

Modifying the inclination of the display

At the factory, the alphanumeric display is installed with a downward inclination. However, it can be turned in vertical direction by 180°; then, the display is inclined upwards.

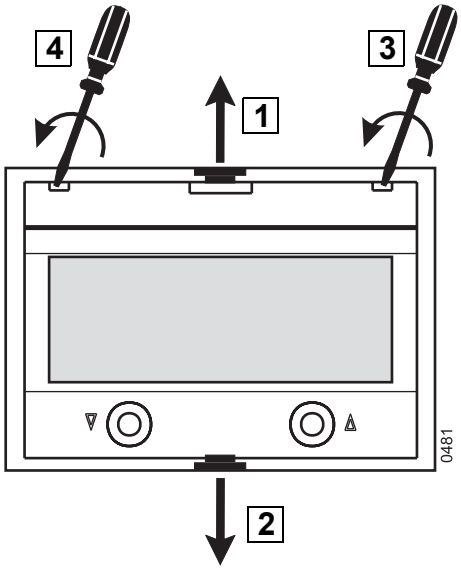
Danger

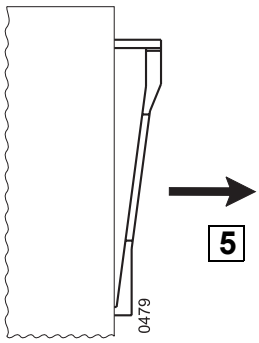
Hazardous voltage!

Can cause death or serious personal injury as well as damage to device and equipment.
Before working on this device the system must be switched off.

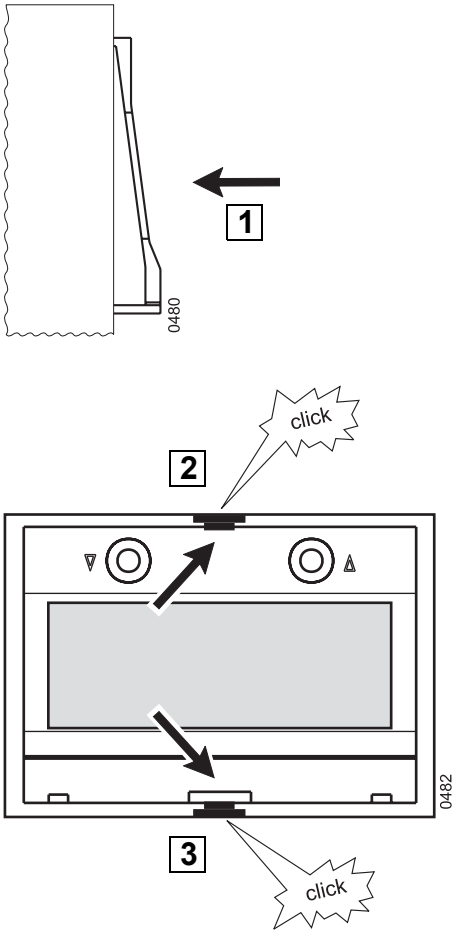
Switching off and discharging the spring(→ page 24 – 2)
– Switch off external 24 V DC voltage supply, if applicable
– Remove sealing cap of overcurrent release, if applicable (→ page 9 – 45)

Removing the display





Installing the display turned by 180° and latching it tight



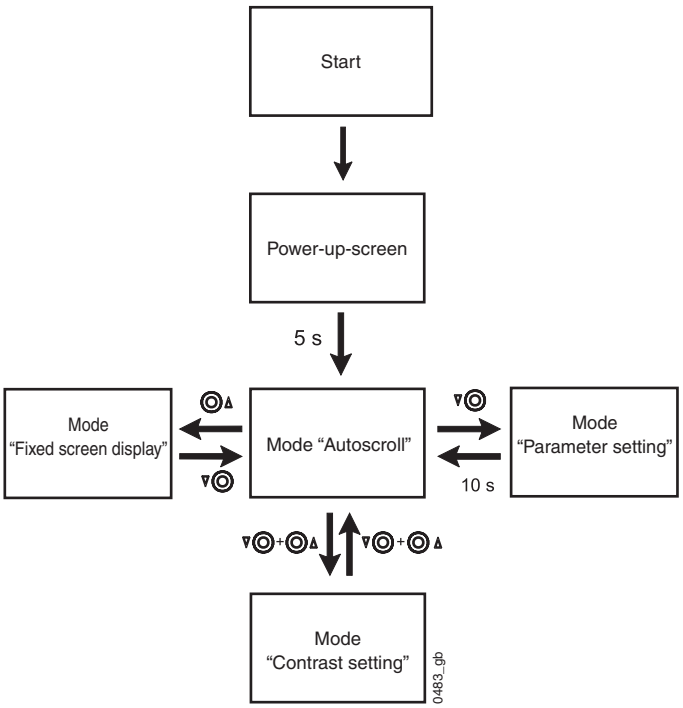
– Install and seal sealing cap of overcurrent release, if applicable, (→ page 9 – 45)
– Switch on external 24 V DC voltage supply, if applicable

	Part no.
Alphanumeric display for XZMU	(+)IZM-XAM

Menu structure XZMU

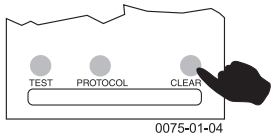
After applying the supply voltage, the display changes from “Power-up screen” to “Autoscroll” mode after about 5 s. From there further modes can be accessed by means of the two buttons.

Overview



Mode “Autoscroll”

During normal operation, the display is in the autoscroll mode.

To get to the “Autoscroll” mode, press the following button(s):	
In the mode “Fixed screen display”	▽ ○
In the mode “Tripping counter reset”	▽ ○ or ○ △
In the mode “Contrast setting”	▽ ○ + ○ △
In the mode “Parameter setting”	Do not press any button for 10 s
In the mode “Tripping info”	

In this mode, there is a change to the next screen every 5 seconds.

If there is no metering module installed, the display changes continuously between the screens 1 and 2.

If there is a metering module available, a total of five screens are displayed in the “Autoscroll” mode.

Screens displayed in the “Autoscroll” mode	
Without metering module	
Screen 1 IL1...=.....00000.A IL2...=.....00000.A IL3...=.....00000.A IN....=.....00000.A	Current I_{L1} Current I_{L2} Current I_{L3} Current I_N
Screen 2 Ig....=.....00000.A	Earth fault current I_g (a value is only shown when an earth fault protection module is installed.)
With metering module installed, additionally	
Screen 3 KW...=.±..00000.kW KVA..=....00000.kVA KVAR.=.±..00000.kVAR PF...=.±..0,000.xxxx	Active power P Apparent power S Reactive power Q Power factor
Screen 4 V12.=.....0000.V V23.=.....0000.V V31.=.....0000.V	Voltage U12 Voltage U_{23} Voltage U_{31}
Screen 5 W.↑.=...00000,00.MWh W.↓.=...00000,00.MWh PowerFlowDir.....↑ f...=.....00,0 Hz	Energy (positive direction) Energy (negative direction) Present direction of energy flow Frequency

Note

The data to be displayed is updated every time the screen page is set up again. There are no updates while a screen page is being displayed.

Button functions in the “Autoscroll” mode	
	Display is frozenSwitchover to the mode “Fixed screen display”
	Change to mode “Parameter setting”
	Change to mode “Contrast setting”

Mode “Fixed screen display”

To get to the mode “Fixed screen display”, press the following button:	
In the “Autoscroll” mode	

In this mode, maintenance information is provided with the number of circuit-breaker tripping and switching operations as well as with maintenance instructions. The information displayed depends on the number of circuit-breaker tripping operations.

The number of trips is only available when the IZM is fitted with IZM-XCOM-DP (incl. IZM-XBSS).

Screen 6 Num.of.Trips...00000 Num.of.Ops.....00000	Number of tripping operations Number of switching operations
Screen 6 Num.of.Trips...00000 Num.of.Ops.....00000 Prepare for contact maintenance	Number of tripping operations Number of switching operations Maintenance instructions

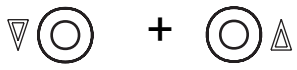
Button functions in the mode “Fixed screen display”	
	Change to next higher screen level
	Change to “Autoscroll” mode
If screen 6 is displayed 	Change to the “tripping counter reset” mode

Submode "Tripping counter reset"

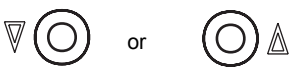
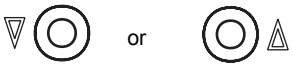
This mode offers the possibility to reset the counter for the tripping and the switching operations to zero.

CAUTION

The counter should only be reset after contact maintenance. If the counter is reset without having performed the contact maintenance, the maintenance instructions displayed will not correspond to the actual condition of the contacts. This can destroy the contacts.

To get to the mode "Tripping counter reset", press the following button(s):	
In the mode "Fixed screen display", when screen 6 is displayed	

Screens displayed in the mode "Tripping counter reset"	
Screen 1 Reset.Trips.and.Ops Counter? yes:.↑+↓ no:.↑.or.↓	This screen is a safety question. Only reset the counter after maintenance of contacts!
Screen 2 Trips.and.Ops Counter.reset continue:.↑.or.	Counter reset for tripping and switching operations confirmed.

Button functions in the mode "Tripping counter reset"	
If screen 1 is displayed	
	Cancelling, no counter reset to zero Change to "Autoscroll" mode
	Counter reset to zero Change to screen 2
If screen 2 is displayed	
	Change to "Autoscroll" mode

Mode "Parameter setting"

CAUTION

Adjust parameters only when the circuit-breaker is switched off.
If the parameters are modified with the circuit-breaker switched on, this can trip the circuit-breaker unintentionally.

In this mode, the following parameters can be adjusted:

– Load shed
– Load restore
– Time delay load shed/load restore
– Language setting for display

To get to the mode "Parameter setting", press the following button:	
In the "Autoscroll" mode	

Screens displayed in the mode "Parameter setting"	
Screen 1 Change Parameters Load.Shed..=.0000.A ↑=+ ↓=- ↑.und.↓=Confirm	Setting Load shed
Screen 2 Change Parameters Load.Restore=.0000.A ↑=+ ↓=- ↑.und.↓=Confirm	Setting Load restore
Screen 3 Change Parameters tx.........=...00.s ↑=+ ↓=- ↑.und.↓=Confirm	Setting Delay time Load shedding/restore
Screen 4 Change Parameters Sprache/Lang=...XXXX ↑=+ ↓=- ↑.und.↓=Confirm	Setting Language display For XXXX can be: ENGL, DEUT
Screen 5 Changed.Parameter being.saved, wait.10s	Parameter settings in process, change to "Autoscroll" mode after 10 s

Note

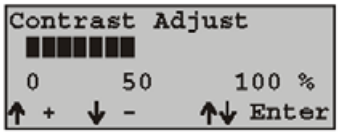
When screen 1, 2, 3 or 4 is displayed and no key is pressed within 10 s, the mode “Parameter setting” is cancelled. Any parameter changes performed are not accepted. Change to “Autoscroll” mode.

Button functions in the mode “Parameter setting”	
	Increases the set value
	Reduces the set value
	Confirms the set value Change to the next screen

Mode “Contrast setting”

In this mode, the contrast of the display can be adjusted.

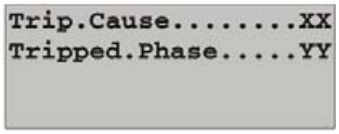
To get to the mode “Contrast setting”, press the following button(s):	
In the “Autoscroll” mode	

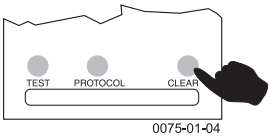
Screens displayed in the mode “Contrast setting”	
Screen 1 	Contrast setting The longer the bar, the higher the contrast

Button functions in the mode “Contrast setting”	
	Increases the contrast
	Reduces the contrast
	Accept the contrast, change to the “Autoscroll” mode

Mode “Tripping info”

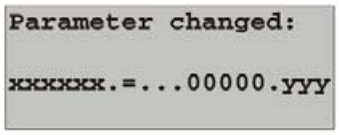
In this mode, there is an automatic change as soon as there is a tripping, provided an external 24 V DC voltage supply has been connected.

Screens displayed in the moce “Tripping info”	
	Type of trip affected phase For XX can be: L, S, I, G, N For YY can be: L1, L2, L3, N

Button functions in the mode “Tripping info”	
	Display of maintenance infomation press again: Return to “Info tripping” mode
	Press CLEAR-button Change to “Autoscroll” mode

Mode “Display parameter changes”

There is an automatic change to this mode if a parameter was changed through the rotary coding switches, provided an external 24 V DC voltage supply has been connected.

Screens displayed in the mode “Display parameter changes”	
	Display of changed values

Technical data with values and units that can be displayed in screen 1

Changed data	Displayed Values	Unit
IR.....=....00000.YY	LT pickup value in primary amperes	A
ISD....=....00000.YY	ST pickup value in primary amperes	A
Ii.....=....00000.YY	IN pickup value in primary amperes	A
Ig.....=.....0000.YY	GF pickup value in primary amperes	A
Ig.ala.=.....0000.YY	GF alarm pickup value in primary amperes	A
tg.....=......000.YY	GF delay: 100 200 300 400 500	ms
I^2tg..=......000.YY	GF I^2t delay: 100 200 300 400 500	ms
I^2tR..=......000.YY	LT I^2t delay: 2 3,5 5,5 8 10 14 17 21 35 30	s
I^4tR..=........0.YY	LT I^4t delay: 1 2 3 4 5	s
tSD....=......000.YY	ST delay: 20 100 200 300 400	ms
I^2tSD.=......000.YY	100 200 300 400	ms
th.mem.=.....000....	ON OFF	..

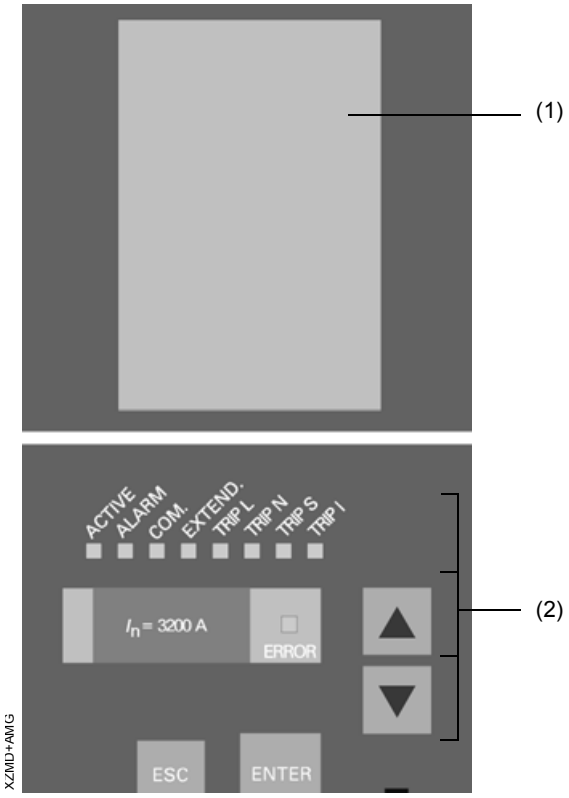
Ir	Current for overload tripping
Isd	Current for short-time delay short-circuit tripping
Ii	Current for instantaneous short-circuit tripping
Ig	Current for earth-fault protection tripping (this is only displayed if there is an earth-fault protection module available)
Ig alarm	Current for alarm display of earth-fault protection (this is only displayed if there is an earth-fault protection module available)
tg	Time delay for the earth-fault protection (this is only displayed if there is an earth-fault protection module available)
I2tg	Inverse-time delay (I^2t-dependant) of earth-fault protection (this is only displayed if there is an earth-fault protection module available)
I2tR	Inverse-time delay (I^2t-dependant) of overload tripping
I4tR	Inverse-time delay (I^4t-dependant) of overload tripping
tsd	Delay time of the short-circuit release
I2tsd	Inverse-time delay (I^2t-dependant) of short-circuit tripping
th mem	Shows whether the thermal memory is switched on/off

Button functions in the mode “Display parameter changes”
The modified value is displayed for 4 seconds. Then the display goes back to the previous mode.

9.1.9.2 Graphic display

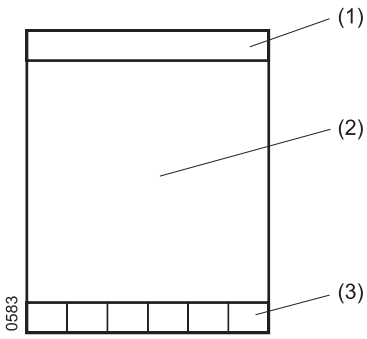
The overcurrent release XZMD is equipped with a fixed-mounted graphical display as standard. This display enables a text output with a maximum of 8 lines or the graphical representation of characteristics.

It is used both to display data and to parameterize the overcurrent release as well as the metering function. The display is operated through the control provided on the overcurrent release.



(1) Graphical display
(2) Control buttons

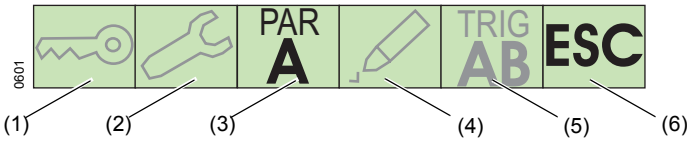
Display design



(1) Menu title
(2) 8-line alphanumeric display or graphical representation
(3) Status line

Status line

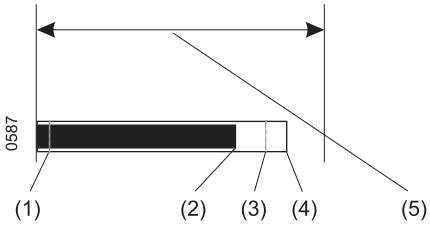
The status line shows, by means of bold symbols, which actions the operator can carry out and which settings are active at this moment.



(1) Access with password only
(2) Maintenance required
(3) Parameter set adjusted for protection functions
(4) Edit feature
(5) Adjusted trigger
(6) Possibilities of action

Representation of bar diagrams

The measured-values for some parameters are displayed both as numerical values and graphically in form of a bar diagram.

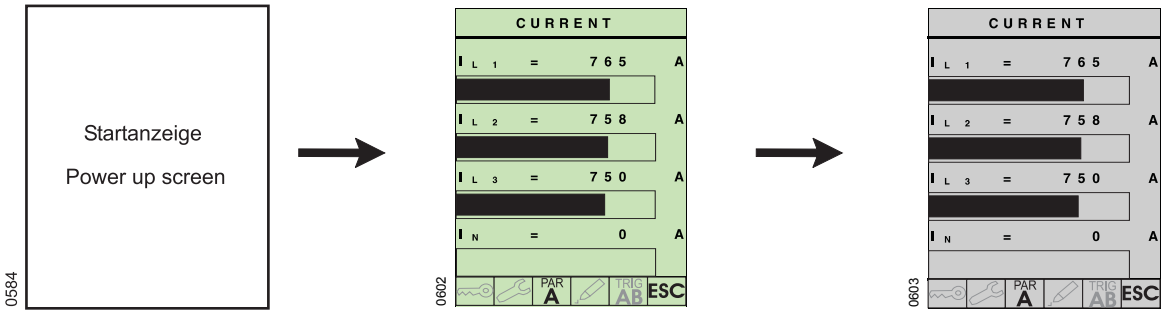


(1) Lowest measured-value
(2) Present measured-value
(3) Highest measured-value
(4) 100 % of the measured parameter
(5) Width of display

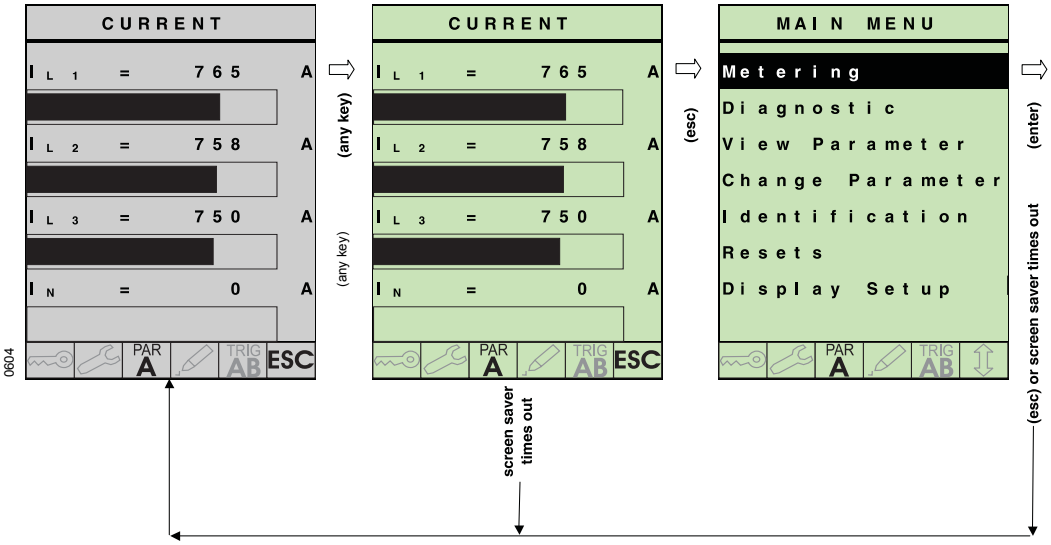
The markings for the lowest and highest measured-value are automatically updated during the measurement.

Display during operation

After applying the supply voltage, the display representation changes from “Power up screen” to the operational screen after about 5 s. It shows the currents in the three phases and in the neutral conductor as values in form of a bar diagram. After approx. 1 min. the background illumination of the display is automatically switched off. It can be switched on again by pressing any button.



Calling the main menu

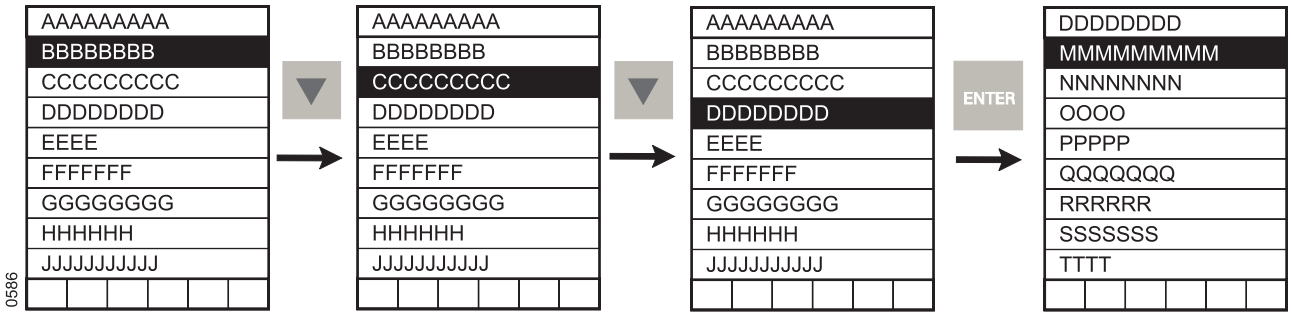


Navigating in the menu structure

To navigate in the menu structure, use the operating keys.

Button functions	
▲ ▼	Shift the marking
ENTER	Select the marked menu item
ESC	Change over to the previous menu

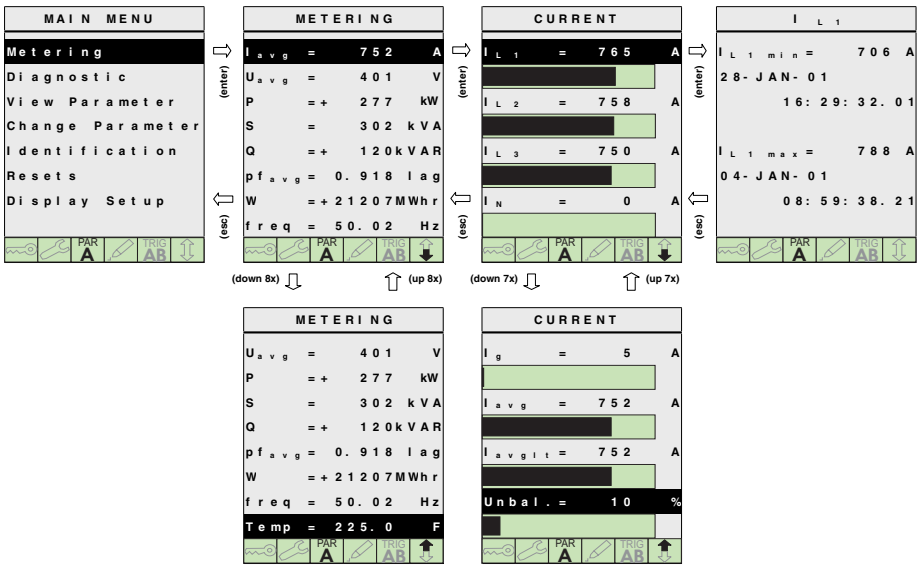
Selection of a menu item



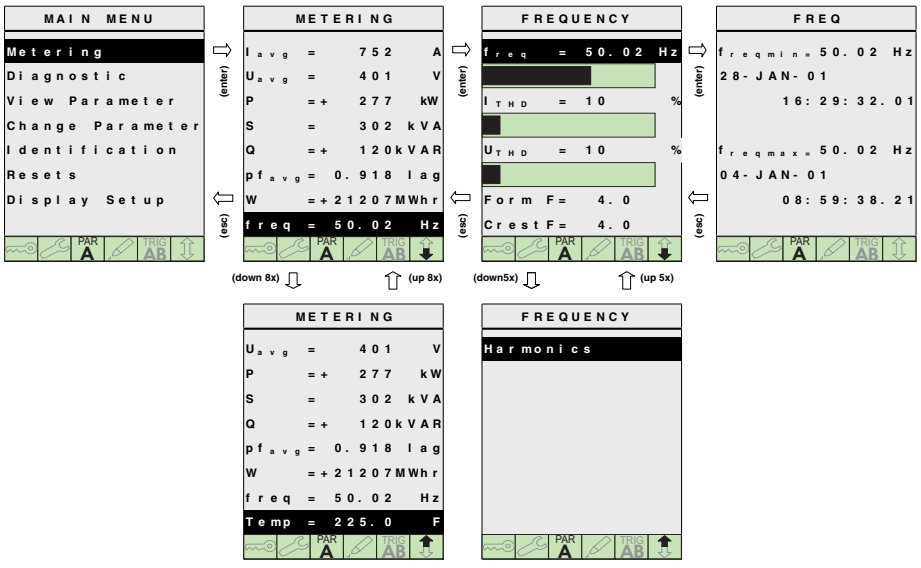
The following pages describe how to display data and how to set parameters.

Displaying measured-values

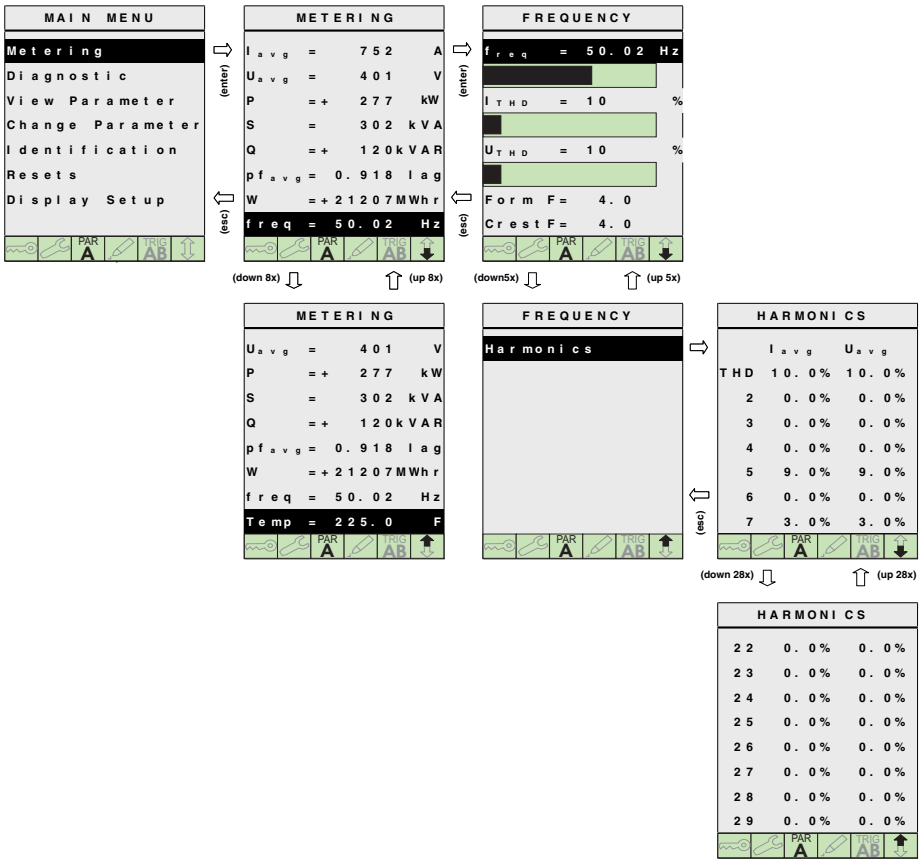
Example 1: Displaying the currents



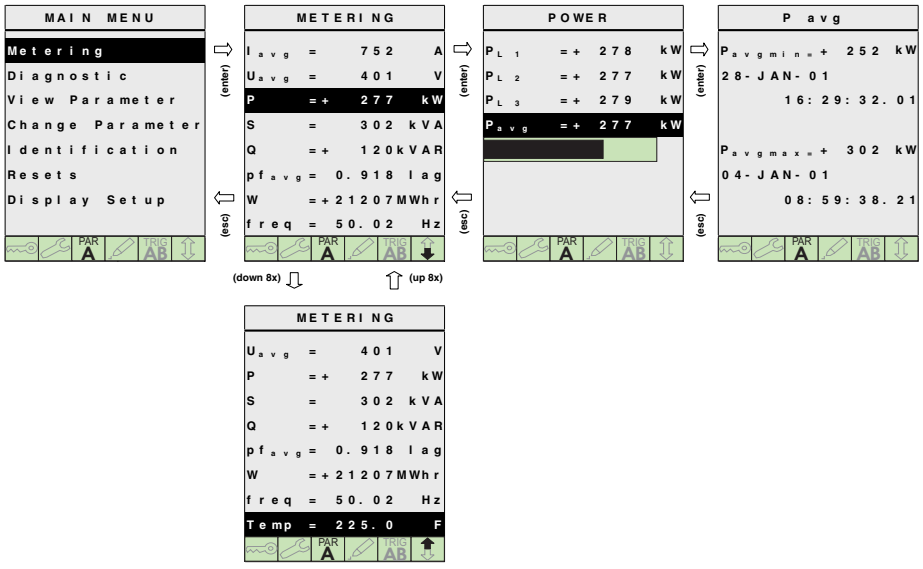
Example 2: Displaying the frequency



Example 3: Display of harmonics

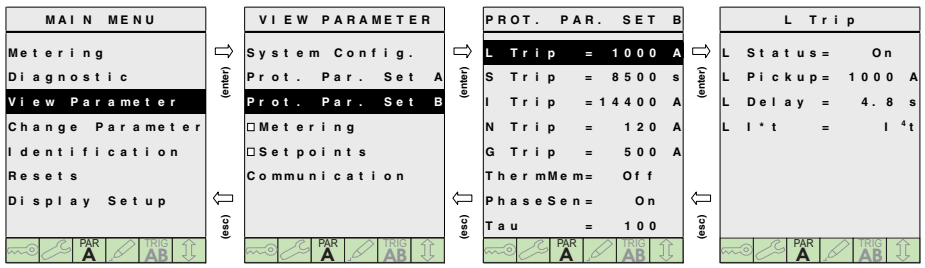


Example 4: Display of power



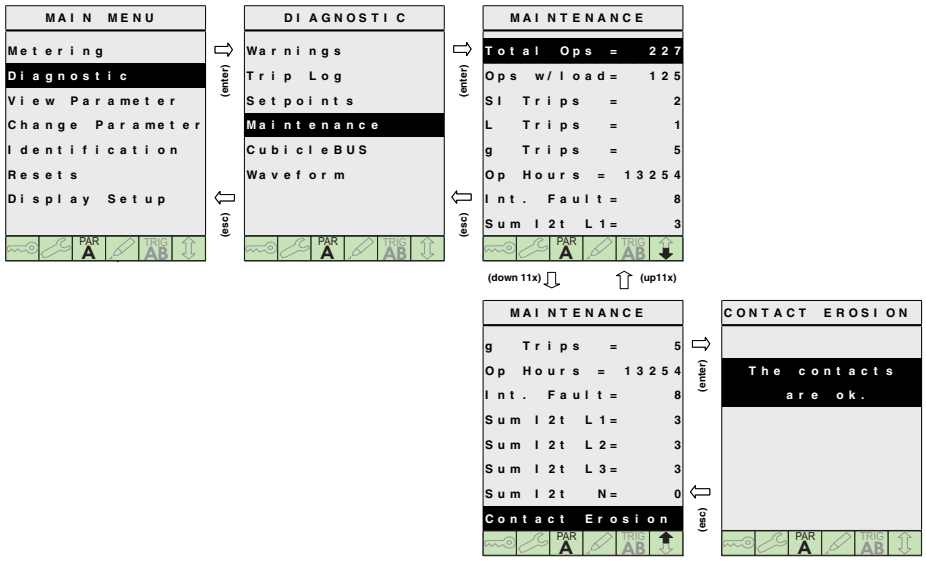
Displaying parameters

Example 5: Displaying settings of protection parameters

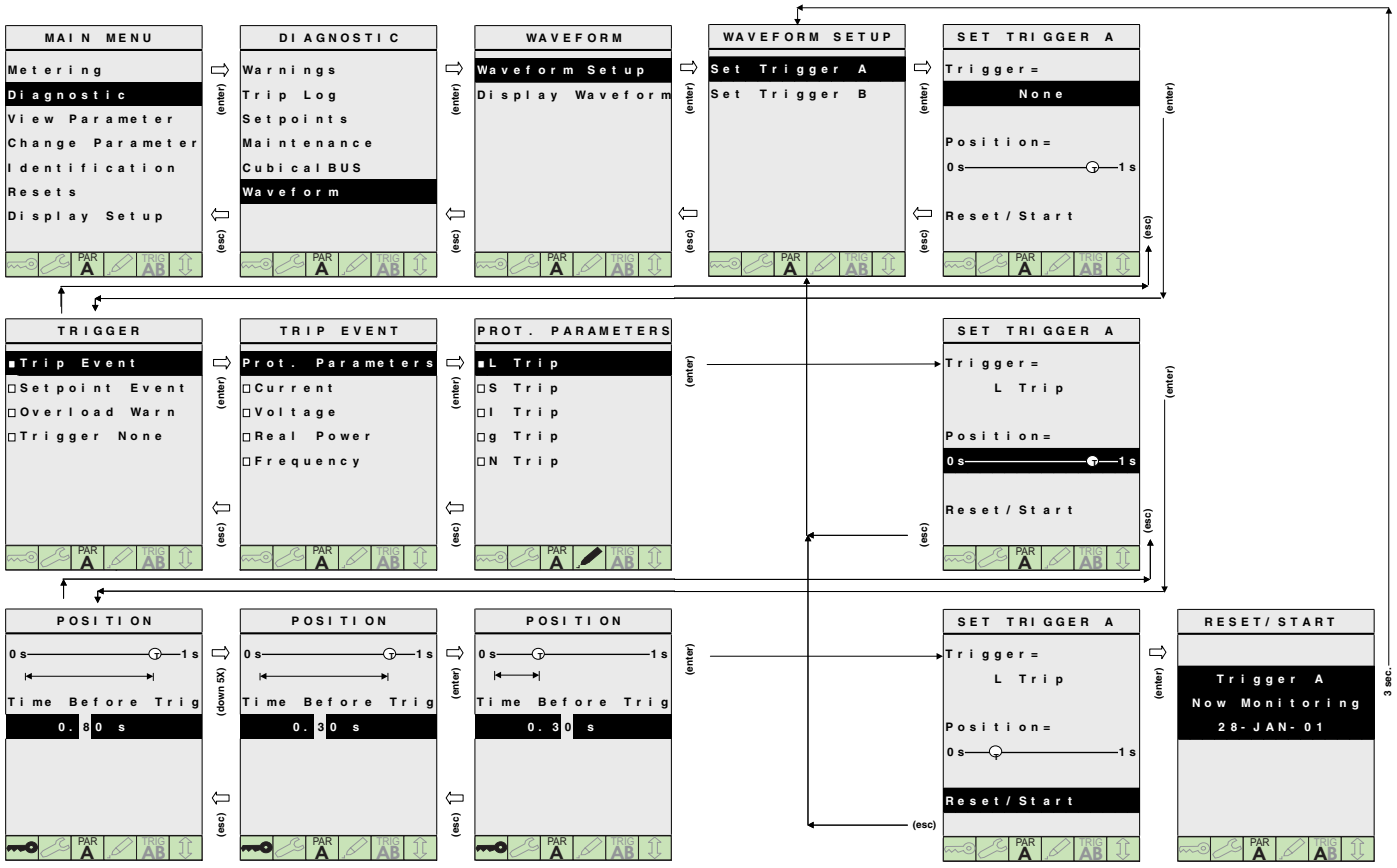


Accessing diagnostics data

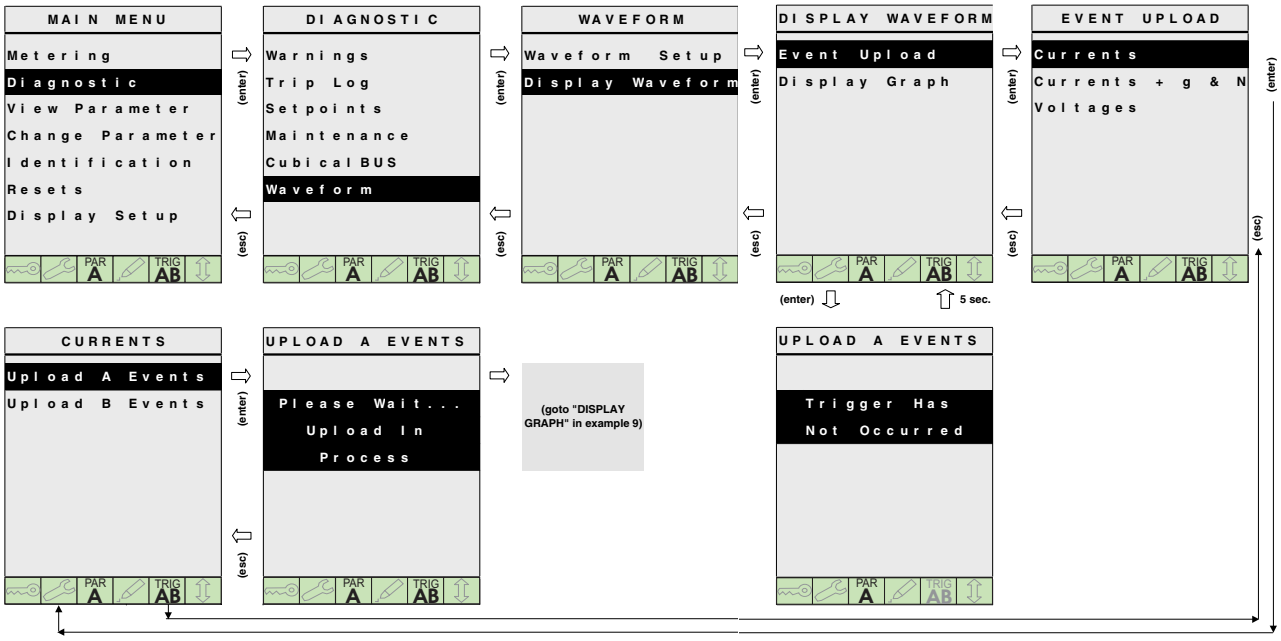
Example 6: Inquiring maintenance information



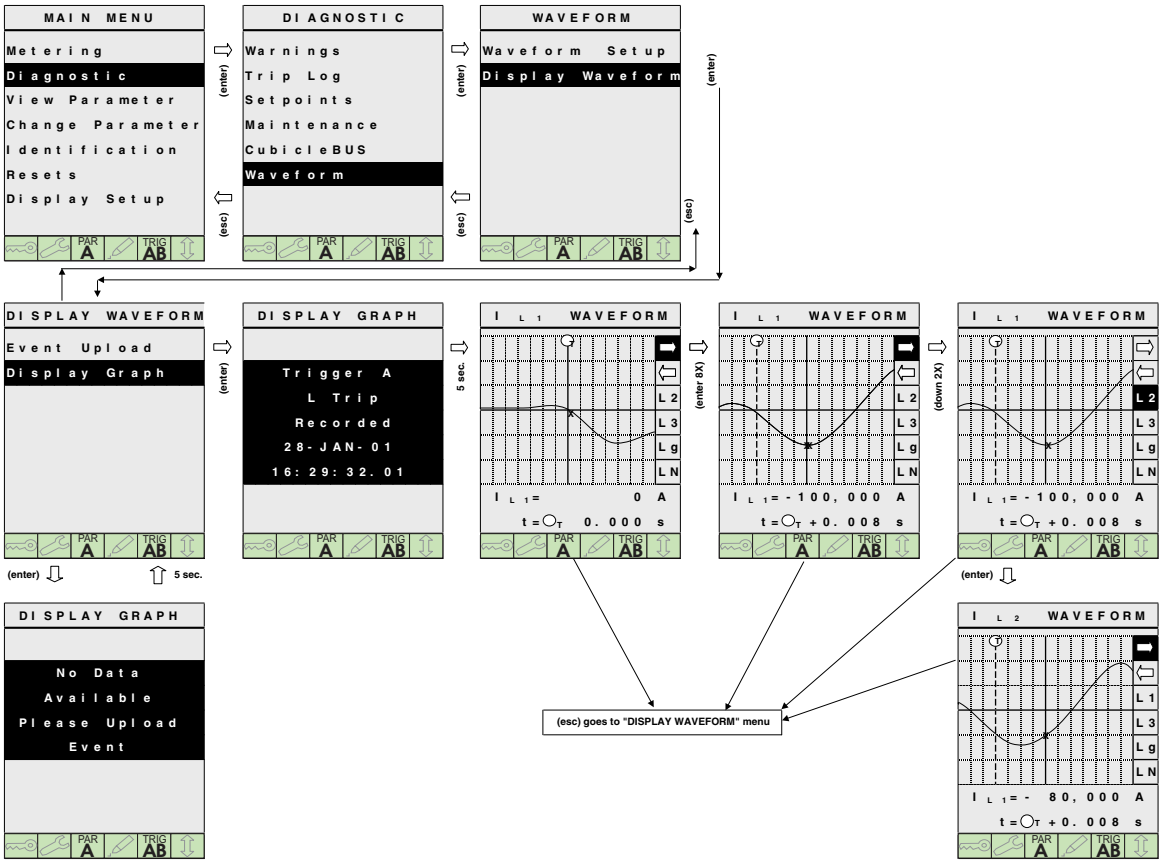
Example 7: Adjusting representation of characteristics



Example 8: Selecting event for displaying characteristics

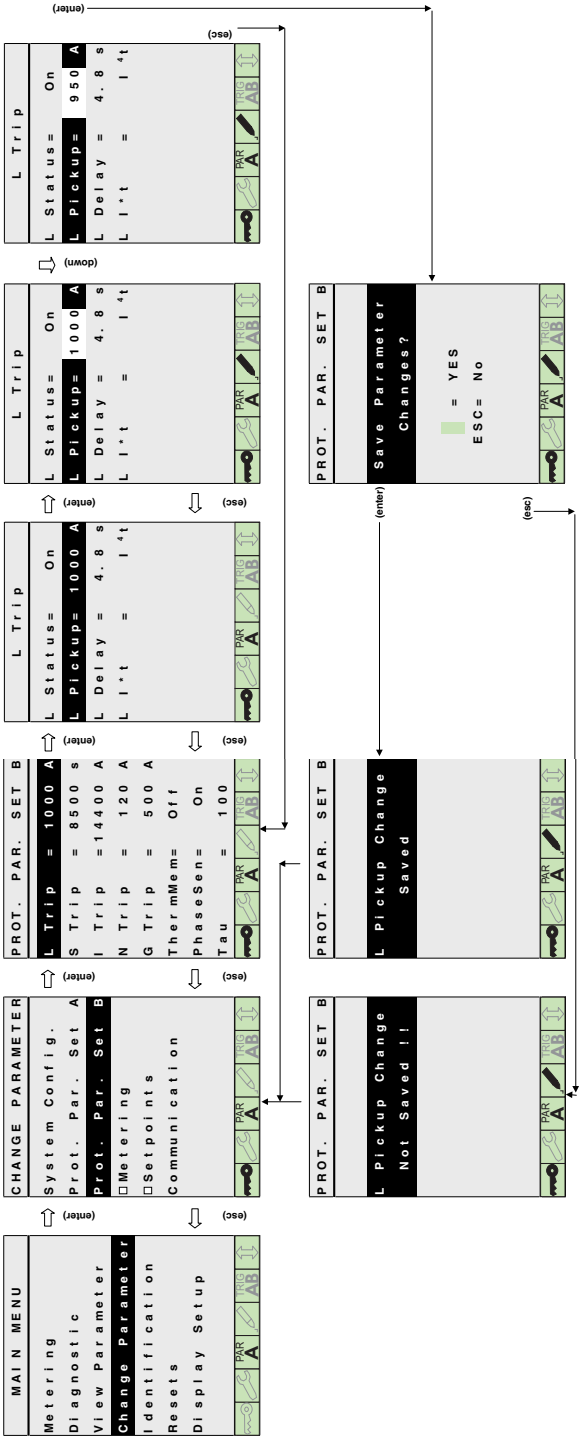


Example 9: Displaying characteristics



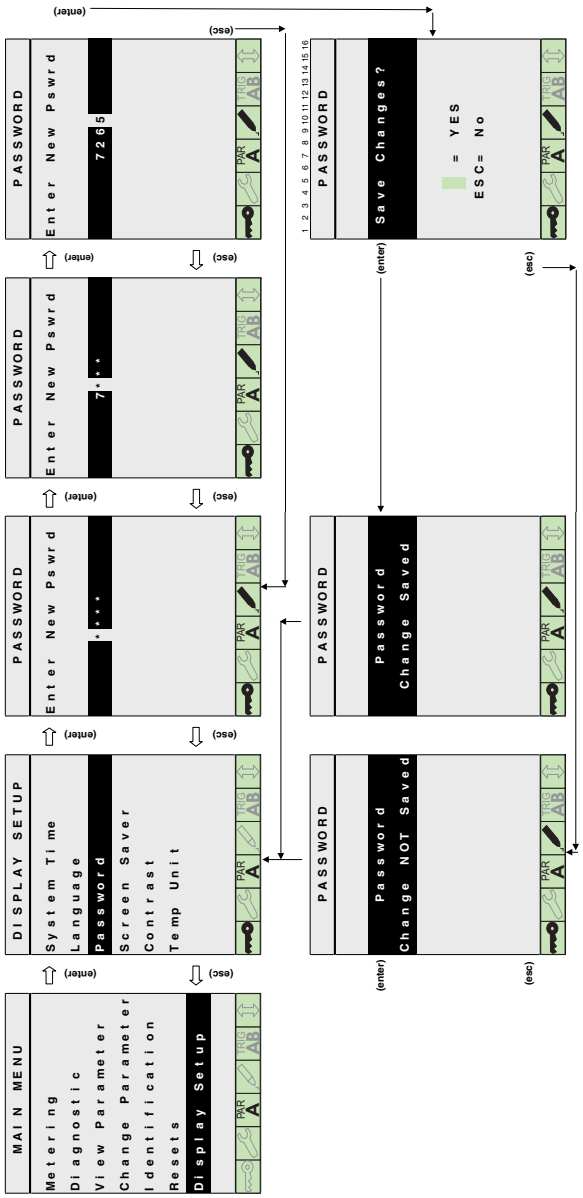
Changing parameters

Example 10: Setting protection parameters



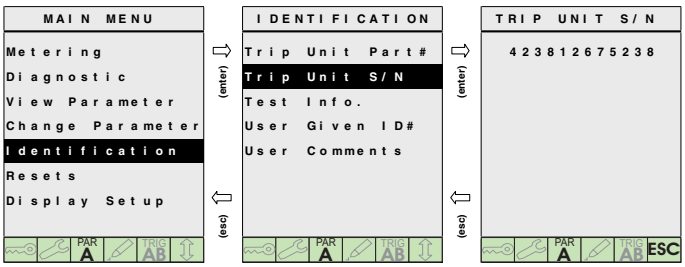
Settings

Example 11: Entering password



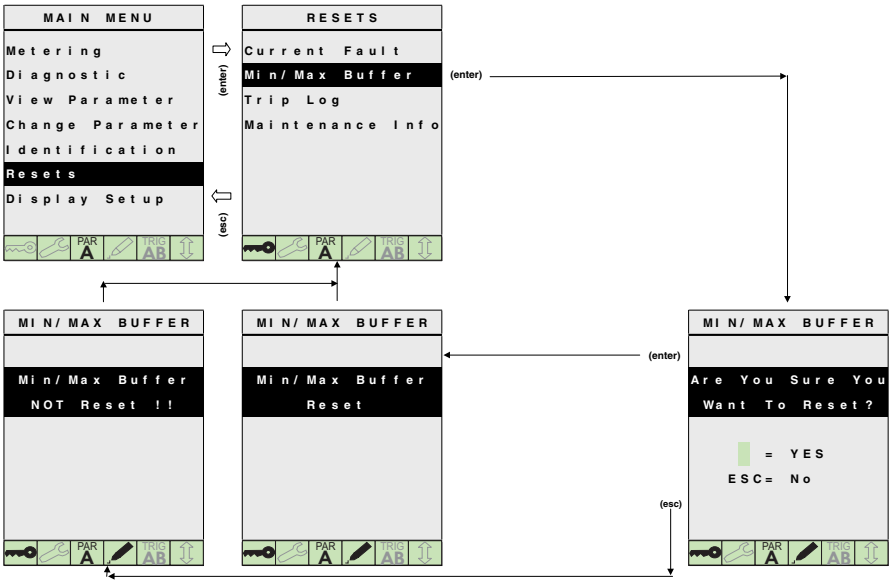
Identifications

Example 12: Identification



Resetting

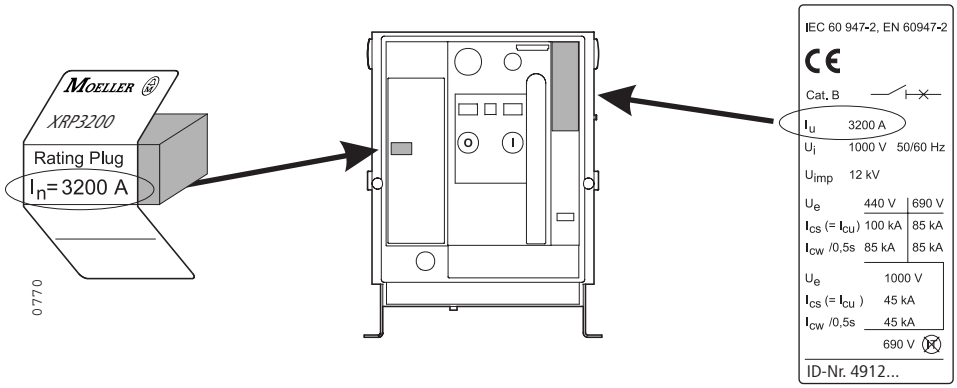
Example 13: Resetting the max. and min. values



9.1.10 Rated current module

CAUTION

When changing the rating plug it must be determined that the rated current In is less or the same as the allowed maximum rated current In max of the circuit-breaker. When not it could cause a thermal overload of the circuit-breaker and perhaps the system.
The smallest allowed rated current for the circuit-breaker IZM.3-… is 1250 A.



The rating plus defines the rated current within a specific range for a given circuit-breaker size.

If a rating plug with a higher current than the maximum permissible circuit-breaker rated current is plugged in, the electronic system of the overcurrent release recognises this error and signals it with a flashing indication ERROR.

The overcurrent release ignores the default value for the rated current provided by the false rating plug and adjusts it to the value of the smallest rating plug provided for the frame size of the circuit-breaker concerned.

The same happens if a circuit-breaker with IZM.3-... is equipped with a rating plug smaller than 1250 A or no rating plug is fitted at all. All protection parameters set are adjusted accordingly. The display flashes.

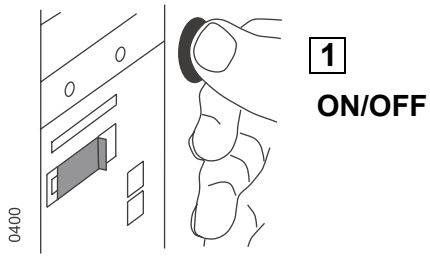
Should a circuit-breaker without rating plug be operated the display flashes ERROR. The overcurrent release sets the rated current to the value of the smallest rating plug provided for the frame size of the circuit-breaker concerned.

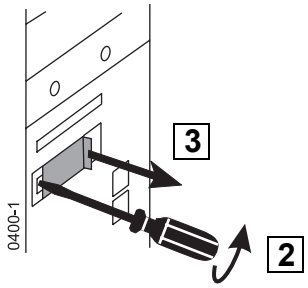
Frame size			Rating plug	Part no.
IZM.1-…	IZM.2-…	IZM.3-…		
			250 A	(+)IZM-XRP250
			315 A	(+)IZM-XRP315
			400 A	(+)IZM-XRP400
			500 A	(+)IZM-XRP500
			630 A	(+)IZM-XRP630
			800 A	(+)IZM-XRP800
			1000 A	(+)IZM-XRP1000
			1250 A	(+)IZM-XRP1250
			1600 A	(+)IZM-XRP1600
			2000 A	(+)IZM-XRP2000
			2500 A	(+)IZM-XRP2500
			3200 A	(+)IZM-XRP3200
			4000 A	(+)IZM-XRP4000
			5000 A	(+)IZM-XRP5000
			6300 A	(+)IZM-XRP6300

Remove

CAUTION

The rating plug may be removed only if:
- The withdawable unit is in the disconnected position
- The fixed circuit-breaker is switched off and the overload release is disconnected from the power supply (remove hand-plug X8)





9.1.11 Earth-fault protection modules

The overcurrent releases XZMU and XZMD can be optionally equipped with earth-fault protection modules. These are used to protect downstream loads against unpermissibly high earth-fault currents.

If the current setting is exceeded, this causes an alarm or – at the same time – the tripping of the overcurrent release, depending on the version of the earth-fault protection module (→ page 9 – 17).

The following variations are possible:

Overcurrent release	Earth-fault module
XZMU	IZMU-XT
XZMD	IZMD-XT

The earth fault can be optionally detected as follows:
- vectorial summation of the currents ΣI = L1+ L2 + L3 + N or
- an external earth-fault current transformer 1200 A : 1 A
- page 9 – 17

ATTENTION

If the earth fault is detected by vectorial summation of the currents, it is imperatively recommended to include the current of the neutral conductor, too. This requires a neutral conductor transformer, which may have to be retrofitted. Otherwise, a corresponding current in the neutral conductor will also activate the earth-fault protection.
With a high level of imbalance the vectorial summation method for earth-fault is not suitable.

Alarm and trip signals can be transmitted through the internal system bus and the PROFIBUS-DP.

Module IZMU-XT

– Earth-fault protection by way of alarm signal and tripping the circuit-breaker
– Tripping function can be switched off, OFF position
– Changeover switch for earth-fault only accessible when front panel removed

Module IZMD-XT

– Earth-fault protection by way of alarm signal and tripping the circuit-breaker
– Tripping function can be switched off
– Module programmable via:
  – The graphical display (XZMD)
  – The test socket with the parameter assignment module XEM-PG(E) (XZMD)
  – The PROFIBUS-DP with a PC and the system-software (XZMD).

Settings for Ig		
	Frame size	
	IZM.1-…/IZM.2-…	IZM.3-…
A	100 A	400 A
B	300 A	600 A
C	600 A	800 A
D	900 A	1000 A
E	1200 A	1200 A
OFF		

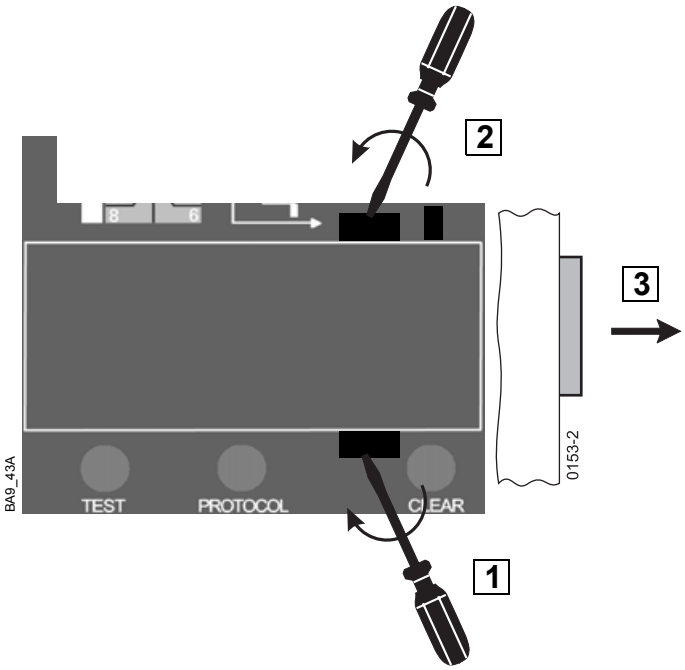
Current settings for t_g	
XZMV, XZMU	t_g = 0.1/0.2/0.3/0.4/0.5 s
XZMD	t_g = 0.1…0.5 s

Retrofitting

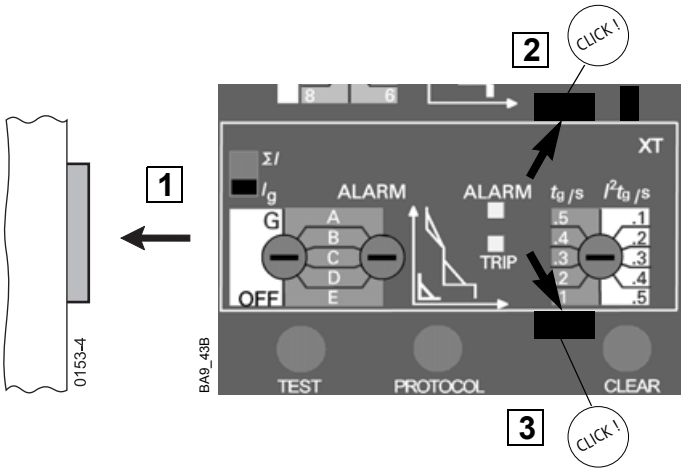
	Danger
	**Dangerous voltage as well as fast, moving parts.** **Can cause death or serious personal injury as well as damage to device and equipment.** Before working on this device the system must be switched off. (→ page 24 – 2) Before removing any covers and the operating panel of the circuit-breaker be sure to discharge the storage spring.

– Switching off and discharging the spring(→ page 24 – 2)
– Switch off external 24 V DC voltage supply, if applicable
– Remove sealing cap of overcurrent release, if applicable (→ page 9 – 45)

Removing dummy module



Installing and latching earth-fault protection module tight



– Switch on external voltage supply 24 V DC, if applicable
– Adjust settings for earth-fault protection
– Test the tripping function with the test unit (→ page 9 – 77)
– Install and seal sealing cap of overcurrent release, if applicable, (→ page 9 – 45)

9.1.12 Removing and replace the overcurrent release

	Danger
	**Hazardous voltage!** **Can cause death or serious personal injury as well as damage to device and equipment.** Before working on this device the system must be switched off.

ATTENTION
Removal only by electrically trained and experienced personnel with special training in the service and assembly of IZM. (→ page 3 – 1)

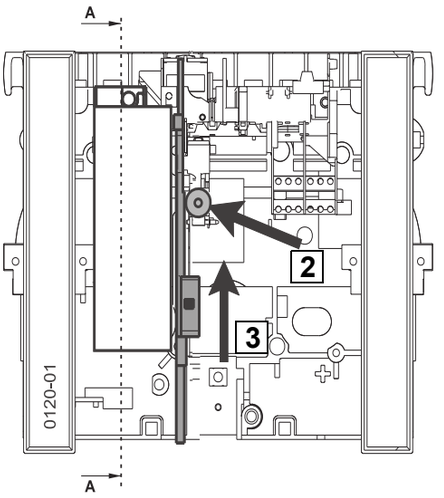
Note

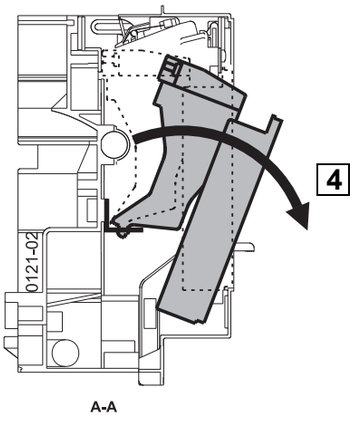
Our After Sales Service personnel are available for refitting of circuit-breakers.

To contact After Sales Service: → Section 26.

In section 26 are also application forms for circuit-breaker changeover.

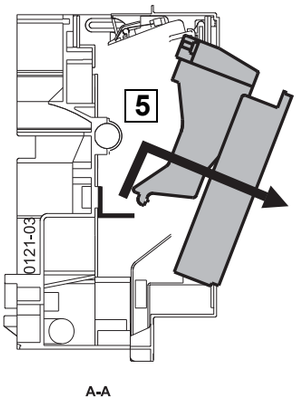
	CAUTION
	Remove overcurrent release only if circuit-breaker is OFF and storage spring is not charged.

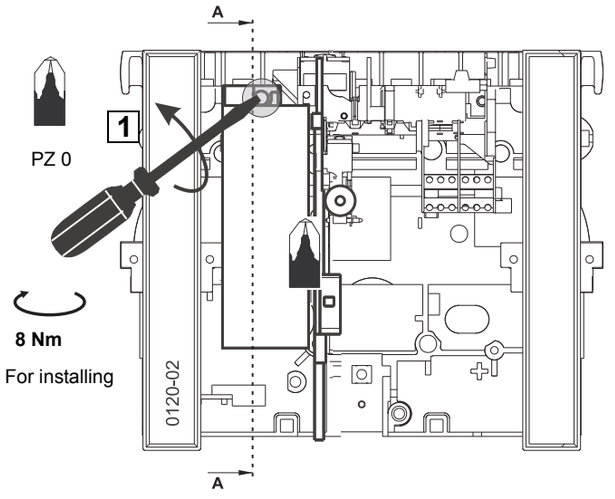


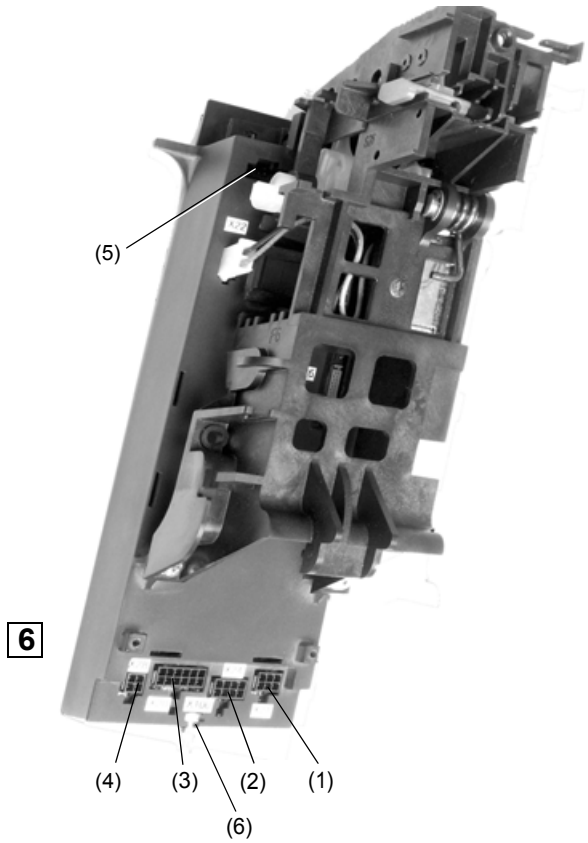


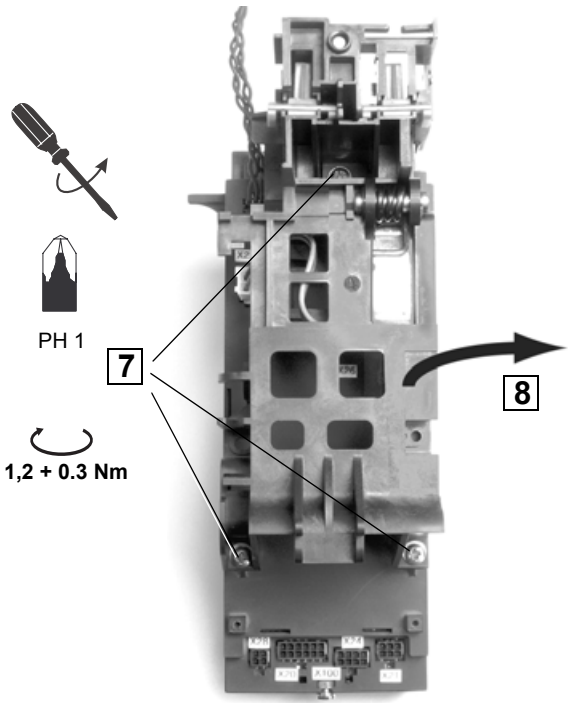
9.1.12.1 Removing

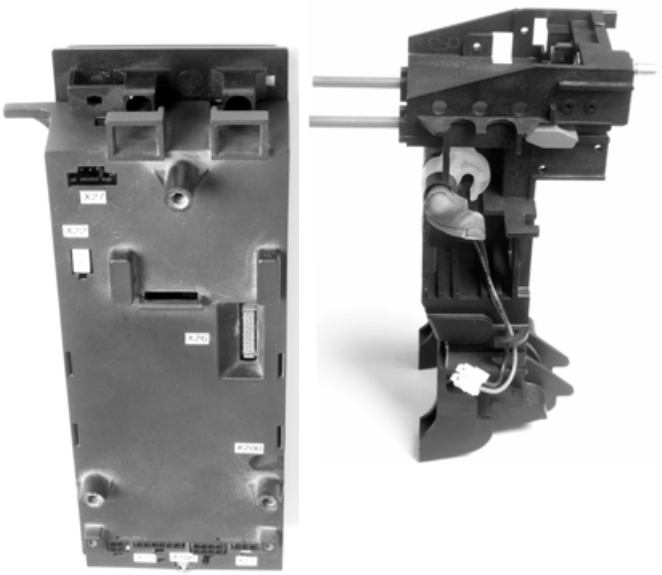
– Switching off and discharging the spring (→ page 24 – 2)
– Remove front panel (→ page 24 – 6)











(1) Energy transformer
(2) N-/g converter
(3) Measurement transducers part 1
(4) Measurement transducers part 2
(5) 5 pole internal system bus
(6) Connection enclosure earth

6 Remove connectors

The connection socket allocation is type dependant

Note

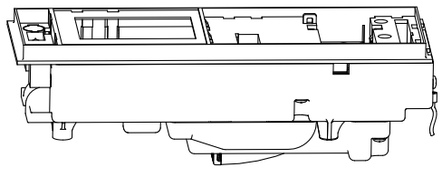
Before removing the plug note the cable positioning. It must be in the same position by assembly to avoid the cables being pinched.

	CAUTION
⚠	Only test the CTs with the approved test unit. Direct measurement on the CT plugs should not be carried out. They could be damaged which can cause a breakdown of the overcurrent release.

9.1.12.2 Overcurrent release exchange

Exchange „Ser.-No. 02“ by „Ser.-No. 02“

Exchange the overcurrent release box.

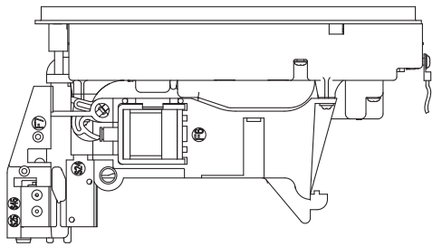


Exchange „Ser.-No. 02“ by “previous version“

Not possible.

9.1.12.3 Replacement for IZM with overcurrent release from release 1 to release 2

Exchange the assembly (overcurrent release box and carrier with accessories, complete article number necessary).



Note

Avoid twisting of the anti-shock mounting. Observe tightening torque.

Installation is done in reverse order.

ATTENTION
After mounting the overcurrent release, always test with the test unit (page 9 – 77)!

The results of the test must be documented. The form “Notification of circuit-breaker modification” must be used. This form can be copied from Chapter 26. So that the tracking of the circuit-breaker equipment can be guaranteed the modifications must be notified on Eaton After Sales Service. The form should be fully filled out and faxed to the given address.

Scope of delivery

– preassembled overcurrent release on equiped carrier
– replacement cable set already connected to overcurrent release
– additional components pre-installed on mounting bracket (e.g. bell switch alarm, etc.) (optional)
– auxiliary conductors (X8) needed for upgrading (optional)

The picture shows one possible delivery version. The delivered version can be different.

Note

For replacement keep in mind, that the replacement kit is only available for an IZM power circuit breaker with a given circuit-breaker ID. The circuit-breaker ID must be given when ordering the new overcurrent release. The circuit-breaker ID can be found on the breaker identification module (label on the black plastic box at the replacement cable set). Use of these replacement kits with another power circuit breaker than an IZM could result in malfunction or loss of protective functions.

Replacement

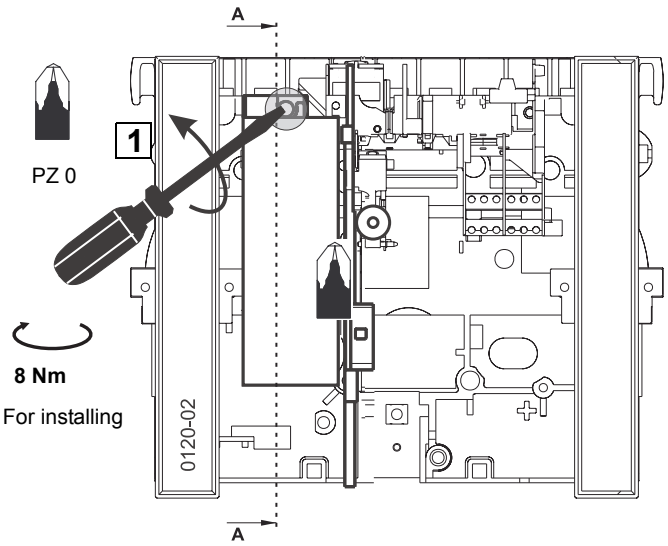
Replace the overcurrent release as follows.

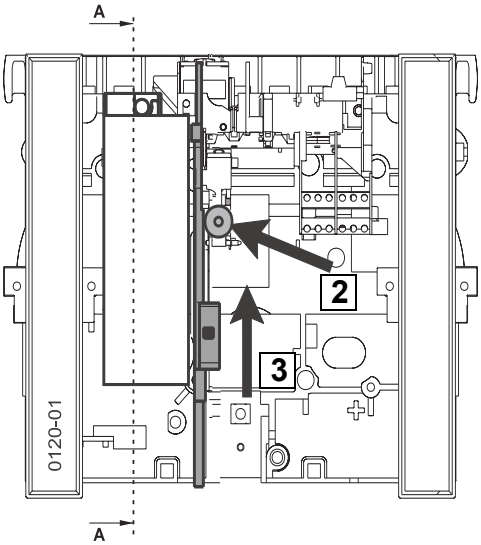
– Switch off and discharge the storage spring (→ page 24 – 2)

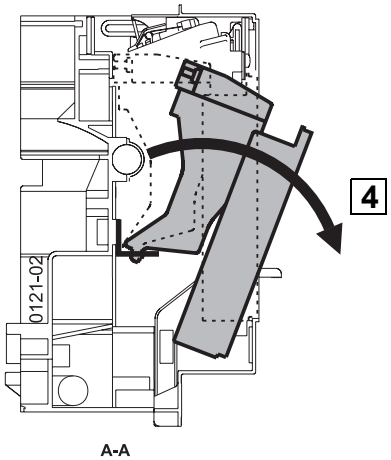
– Crank the circuit-breaker into disconnected position (drawout breakers only) (→ page 24 – 3)

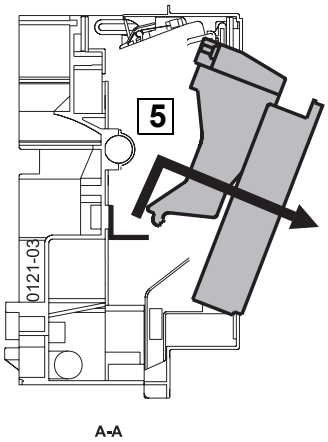
– Remove front panel (→ page 24 – 6)

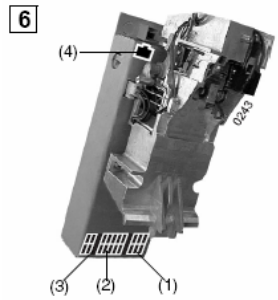
– Remove old overcurrent release





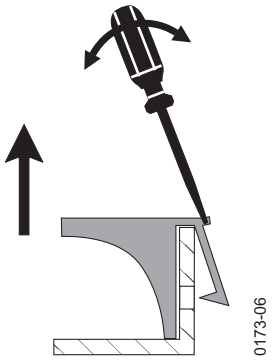






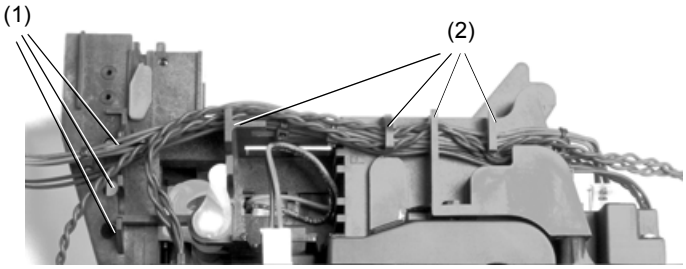
(1) Energy transformer
(2) Current transformer
(3) N-/g converter
(4) 5 pole internal system bus

– Remove installed auxiliary connector X8 (if any)



– If power circuit breaker has an internal neutral current transformer (→ page 9 – 67) remove the cable between the overcurrent release connector X24 (4pole connector) and the auxiliary connector X8 terminal 11, 12.

Integrate the cable in the new part as shown below. Be sure that the cables are not damaged and installed safely.



(1) 3 holes as fixing points
(2) Fixing aids

Note

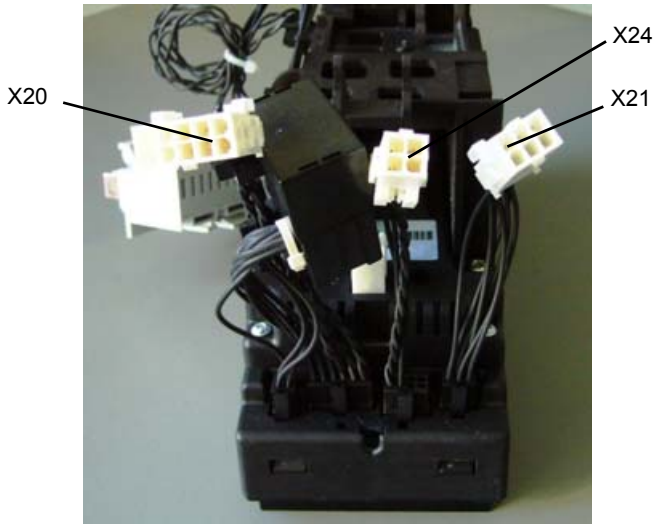
Lay all cables as shown above and fix them with cable straps at the fixing points. Lead the cables around the fixing aids and fix them directly on the left and right of the aids with cable straps.

– Remove the rating plug out of the old overcurrent release and install it in the new one (→ page 9 – 35).

– If existing remove the alphanumeric display out of the old overcurrent release and install it in the new one (→ page 9 – 20).

– If existing remove the earth-fault protection module out of the old overcurrent release and install it in the new one (→ page 9 – 36).

– Install the new overcurrent release Series No.02 in reverse order. Connect the X20 and X21 connectors with the replacement cable set as shown below. If the circuit breaker is equipped with an internal neutral current transformer additionally connect the X24 with the replacement cable set.



– Installation of the breaker is done in reverse order.

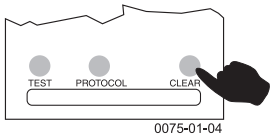
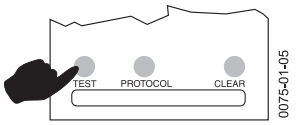
– After replacing always test the power circuit breaker with the hand-held tester IZM-XPH (226018) (→ page 9 – 77).

9.1.13 Internal self-test of the overcurrent tripping function(XZMV, XZMU, XZMD)

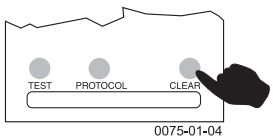
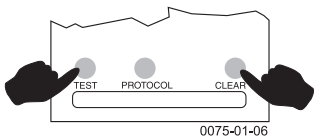
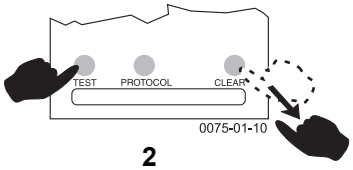
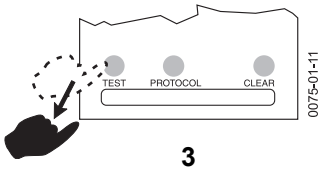
For commissioning and function testing

Conditions

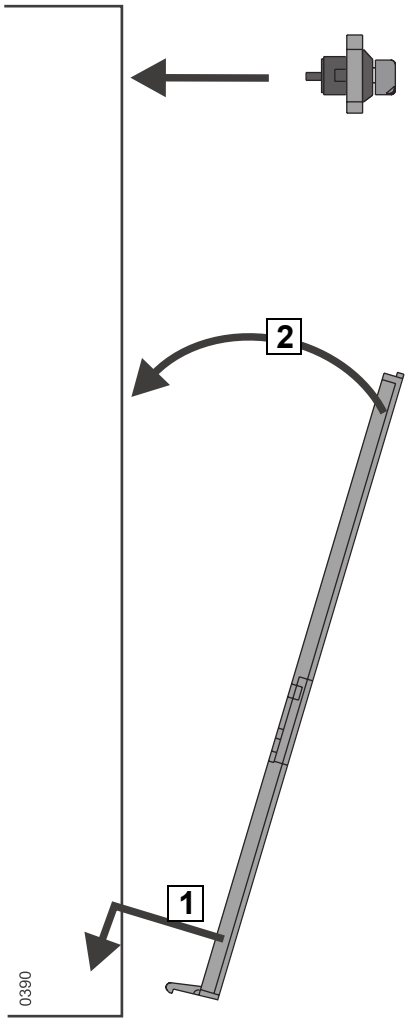
– Release is activated by:
  • Operating current[1)] or
  • External voltage supply (possible only with XZMU and XZMD)
– Current not in overload range → Indications (page 9 – 15)

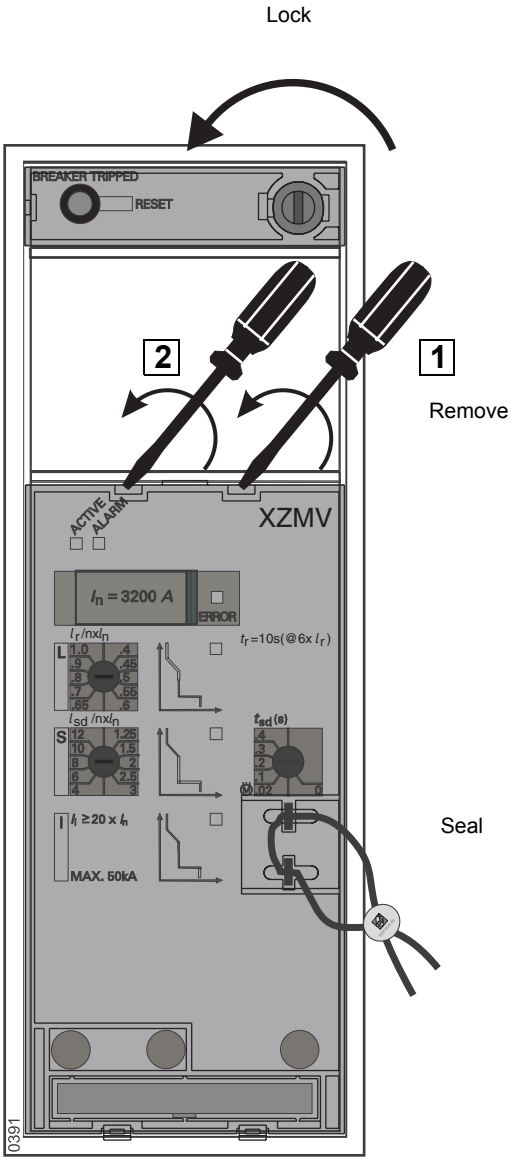
	Internal self test of the circuit-breaker without tripping		
	Normal operation of the circuit-breaker is not impaired		
	The test can be interrupted at any time by pressing CLEAR 		
1			
2	**Lighting sequence from top to bottom** (All indicators will light up one after other)		
3	The flash time corresponds to the time-lag class t_r		The flash time deviates from the set time-lag class t_r more than 10 %
4	LED L-tripping lights up Test OK:	LED ERROR lights up Test not OK:	Test not OK Overcurrent release is defective, even if LED L-tripping lights up
5	– Indication goes out after 30 s – End of the self-test – Abort test with CLEAR		
6	Overload release OK	Please carry out a comprehensive test with test unit	

1) Minimum current → page 9 – 15.

	Internal self test of the circuit-breaker with tripping		
	Internal self test with tripping should only be performed if downstream circuits are allowed to be safety disconnected!		
	The test can be interrupted at any time by pressing CLEAR 		
1	 **1**  **2**  **3**		
2	**Lighting sequence from top to bottom** (All indicators will light up one after other)		
3	The flash time corresponds to the time-lag class t_r		The flash time deviates from the set time-lag class t_r more than 10 %
4	Circuit-breaker tripped Test OK	Circuit-breaker not tripped Test not OK	Test not OK Overcurrent release is defective, even if the circuit-breaker trips
5	→ Re-starting a tripped circuit-breaker (page 6 – 7)	– Testing with hand tester – check wiring release – release coil – check release coil	

9.1.14 Sealing and locking equipment





Note

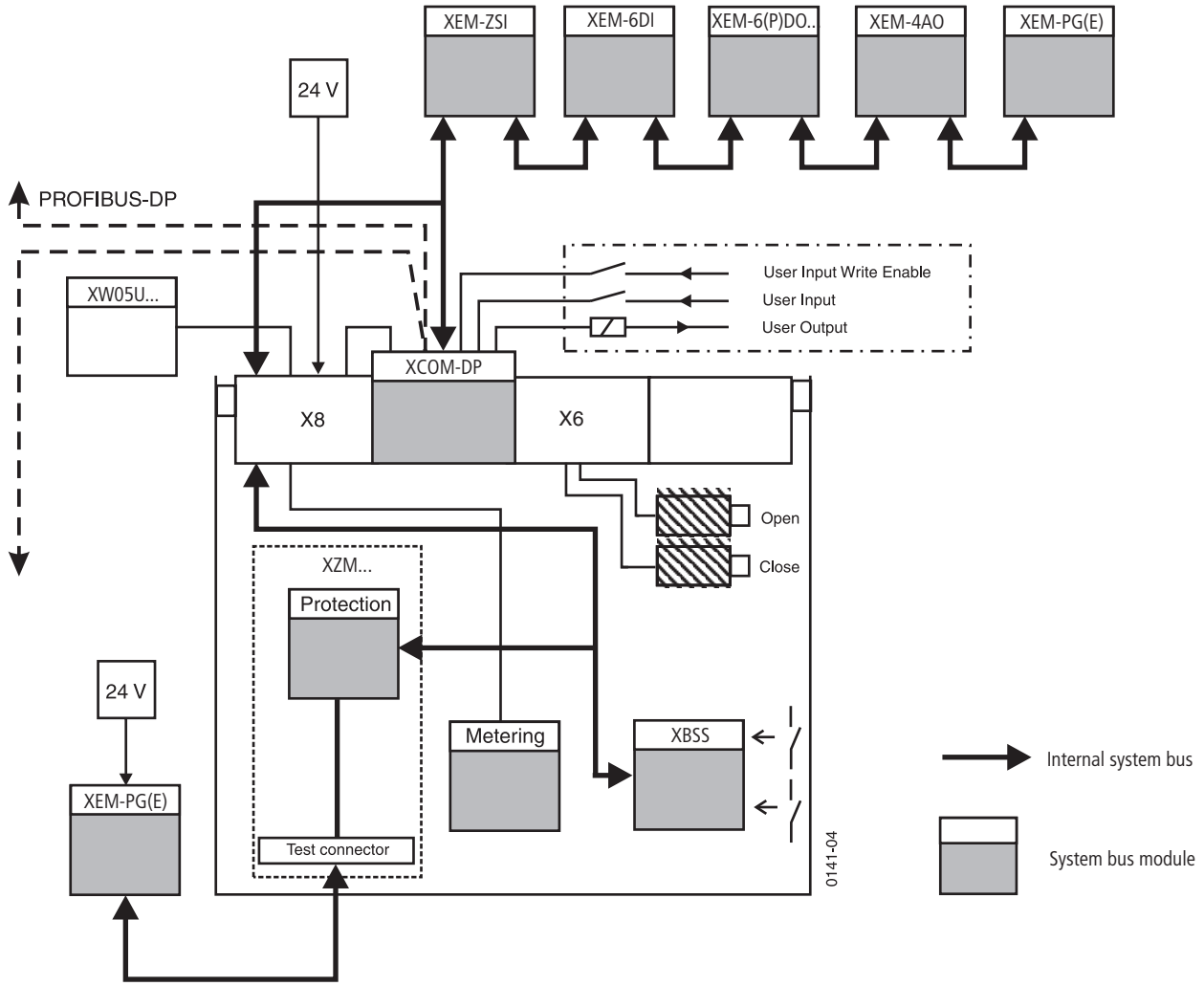
Keep sealing wire as short as possible!

	Part no.
IZM...-A..., IZM...-V..., IZM...-U...	IZM-XHB
IZM…-D…	IZM-XHBG

Additional information (→ page 15 – 5).

9.2 Additional communication features

9.2.1 System architecture



– **Internal system bus:** Internal bus system for interconnection of circuit-breaker components and for connection of external system bus modules
– **PROFIBUS-DP:** Field bus for connection of automation components
– XCOM-DP: Communication module for interconnection of internal system bus and PROFIBUS-DP
– **Protection:** Protection module
– **XBSS:** Breaker Status Sensor for acquisition of signals about the circuit-breaker status
– **XZM…**: Electronic overcurrent release
– **XEM-ZSI**: Module for zone selective interlocking, must always be connected as the first module
– **XEM-6DI**: Digital input modules for potential-free input signals – “0/1”-signals; two modules with different configurations connectable as a maximum
– **XEM-6(P)DO…:** Digital output modules with 6 outputs each; three modules with different configurations or versions connectable as a maximum
– **XEM-PG(E):** Device for parameterizing, testing, operating and monitoring the circuit-breaker via any input/output unit with browser features; connection through test socket of overcurrent release or western socket (RJ45) of the last external system bus module
– **XEM-4AO**: Analog output module
– **VT**: Voltage transformer
– **Metering**: metering function harmonic XMH

Note

The bus cable must be terminated with a 120 Ω resistor at the last participant on the internal system bus.
On external expansion modules, it is installed directly on the module. If an external module is not connected a terminal resistor must be connected between terminals X8-1 and X8-2 on the circuit-breaker
The basic functions of the electronic overcurrent releases do not require auxiliary power supply.
Should further functions of the overcurrent release be used that require a data exchange over the internal system bus, an external 24 V DC power supply must be connected.
(→ page 9 – 73).

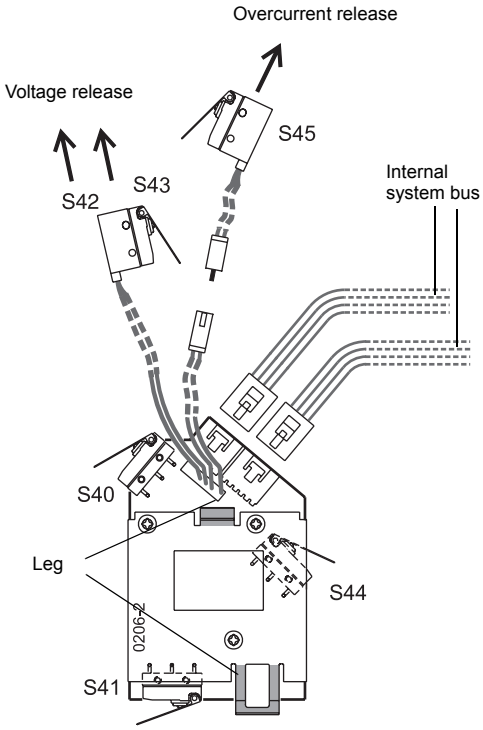
Maximum assignment configuration of the internal system bus (13 participants):

– Overcurrent release XZMU(R)(D)
– Measurement function “harmonic” XMH
– Breaker Status Sensor XBSS
– Communication module XCOM-DP
– Parameter assignment module XEM-PG or XEM-PGE
– Zone selective interlocking module XEM-ZSI
– Digital output module XEM-6DOwith left switch position
– Digital output module XEM-6DOwith right switch position
– Digital configurable output module XEM-6PDO
– Digital input module XEM-6DIwith left switch position
– Digital input module XEM-6DIwith right switch position
– Analog output module XEM-4AO with left switch position
– Analog output module XEM-4AOwith right switch position

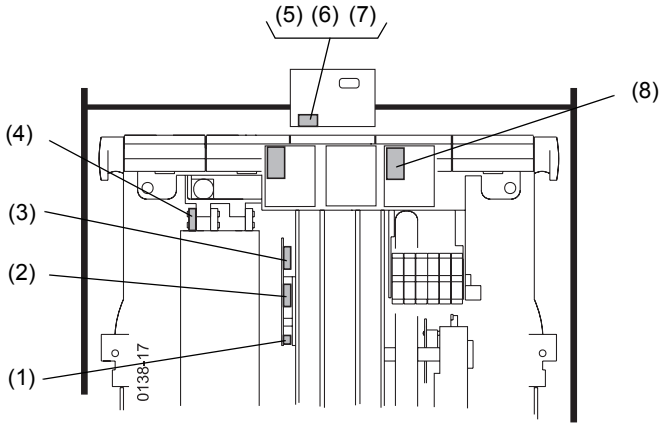
9.2.2 Internal modules

9.2.2.1 Breaker Status Sensor (XBSS)

For collecting circuit-breaker status information via signaling switches and transmitting these data on the internal system bus.



Status signals for the communication



(1) Signalling switch spring charged S41
(2) Signalling switch ON-OFF position S44
(3) Signalling switch ready-to-close S40
(4) Trip signalling switch S45
(5) Signalling switch connected position S46
(6) Signalling switch test position S47
(7) Signalling switch disconnected position S48
(8) Signaling switch S42/S43 on second shunt trip or on undervoltage trip

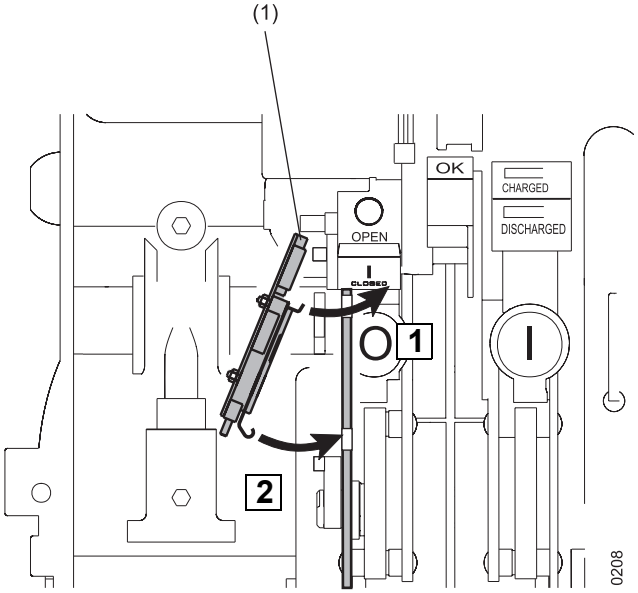
Note

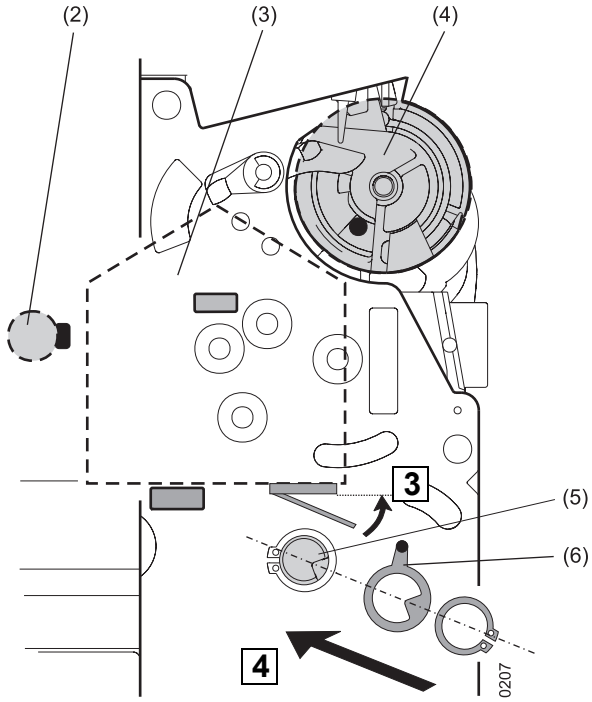
Signalling switches (6) – (8) on the communication module XCOM-DP only active in combination with withdrawable technique.

Installing the Breaker Status Sensor

	Danger
	Before working on the device be sure to switch off the switchboard and earth the device.

– Switching off and discharging the spring(→ page 24 – 2)
– Remove front panel (→ page 24 – 6)
– Remove overcurrent release (→ page 9 – 39)

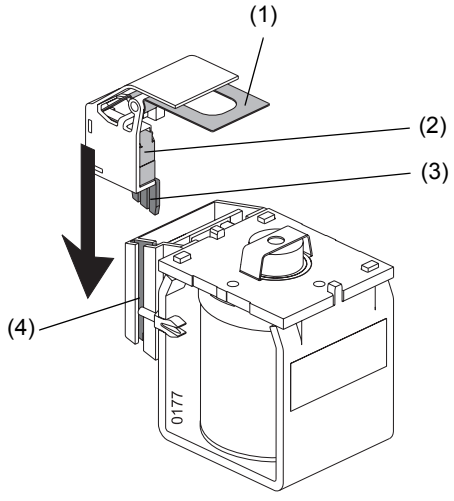




(1) Breaker Status Sensor XBSS
(2) Switching shaft
(3) XBSS
(4) Ready-to-close indicator
(5) Operating shaft
(6) Driver

Fitting signalling switch on the voltage release

1st voltage release: signalling switch S42
2nd voltage release: signalling switch S43

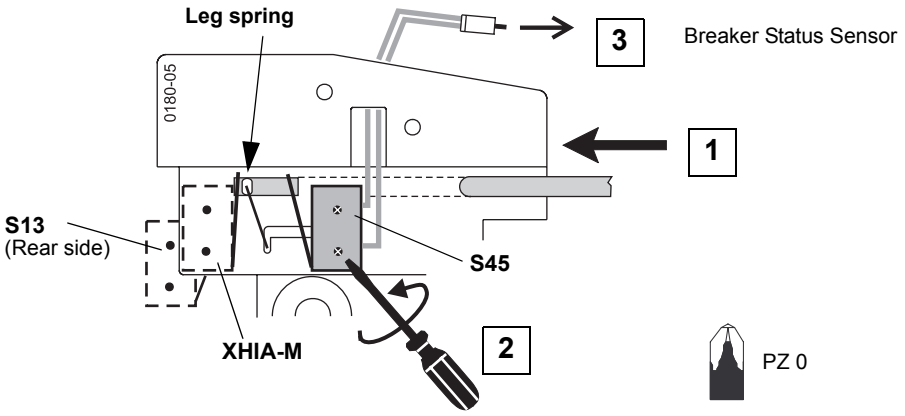


(1) See-saw
(2) Signalling switch
(3) Guide
(4) Groove

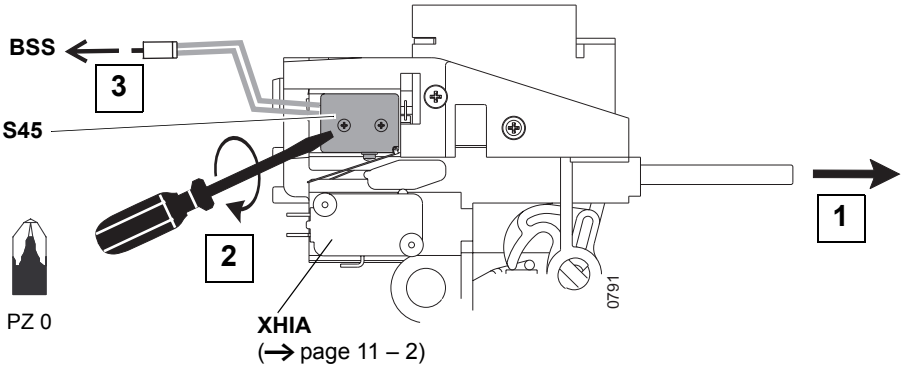
Fitting signalling switch on the protection module (rear side overcurrent release)

CAUTION
Tighten self-tapping screws carefully. The signalling switch must not be deformed during installation.

Metal bracket for overcurrent release (silver):



Plastic bracket for overcurrent release (black):



Connecting the Breaker Status Sensor

	Danger
	**Hazardous voltage!** **Can cause death or serious personal injury as well as damage to device and equipment.**
	Before working on this device the system must be switched off.

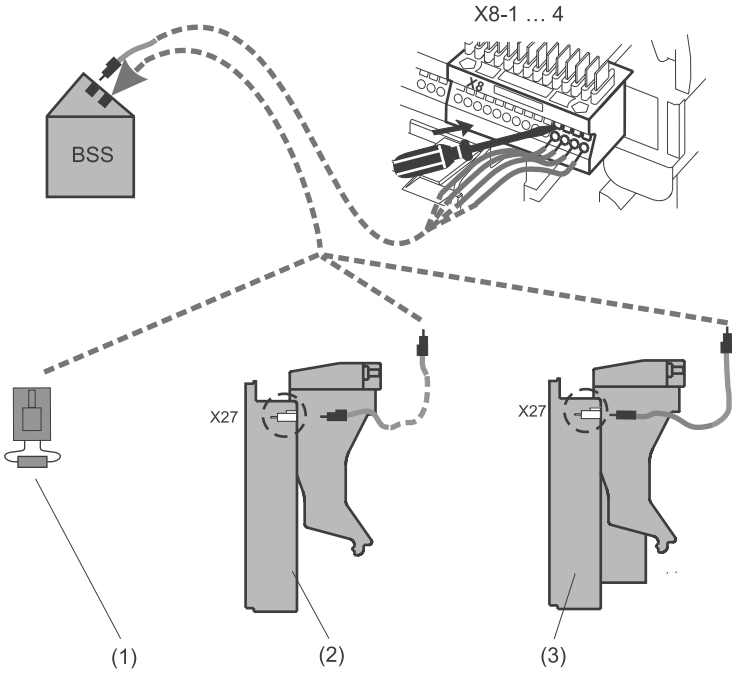
The first connection of the internal system bus is on the connector X8. The second connection is depandant upon the circuit-breaker features.

→ Circuit diagrams (page 8 – 1)

Note

It may be necessary to retrofit missing control-circuit connections (knife contact rail, auxiliary plugs, sliding contacts for connection area). (→ page 5 – 19)

Connection XBSS → page 9 – 57.



(1) Termination resistor after change to a trip unit without communication capability
(2) XZMU and XZMD without metering function
(3) XZMU and XZMD with metering function

9.2.2.2 Communication module XCOM-DP

Interface adapter for:

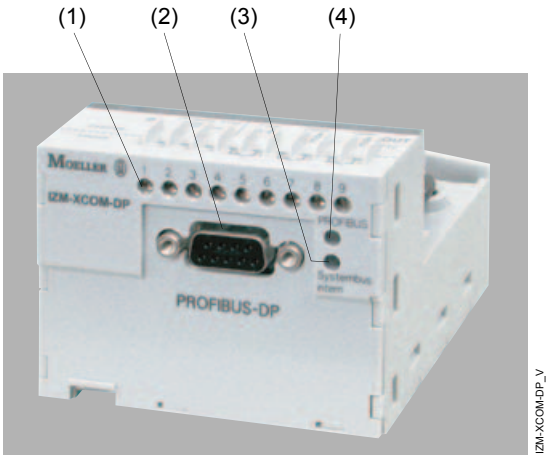
– Converting the signals of the internal system bus to PROFIBUS-DP signals and vice versa

– On withdrawable circuit-breakers:Detecting the circuit-breaker position in the withdrawable unit with the auxiliary switches S46, S47 and S48, and emitting the corresponding signals on the internal system bus and the PROFIBUS-DP.

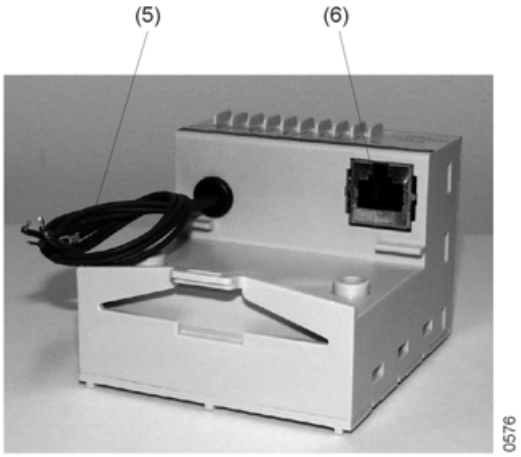
– Providing special functions through additional inputs and outputs (e.g. to control the circuit-breaker and for parameterization)

Further information is given in the “Communication manual circuit-breaker IZM”.

Design



(1) Connection terminals for additional inputs and outputs to provide special functions
(2) SUB-D plug, 9-pole, for PROFIBUS-DP connection
(3) Internal system bus LED
(4) PROFIBUS-DP LED



(5) Connecting cables to hand plug X8
(6) Connection of the internal system bus for external expansion modules or for the termination resistor

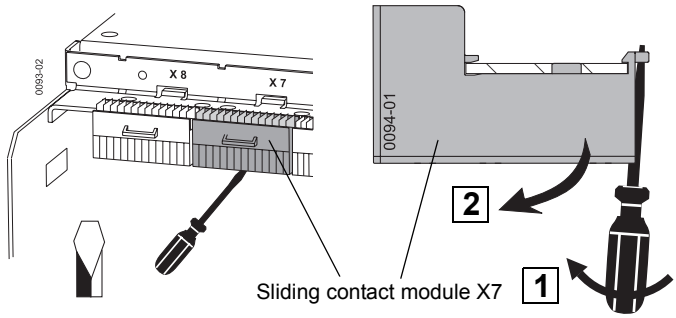
Indications

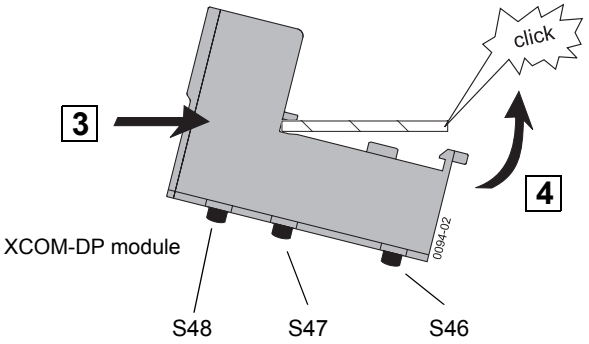
LED	Indicator	Significance
PROFIBUS-DP	Off	No voltage at XCOM-DP
	Green	PROFIBUS-DP communication operating
	Red	Bus fault or bus does not respond
Internal system bus	Off	No modules at the internal system bus found
	Green	Communication via internal system bus operating
	GreenFlashing	Participant at the internal system bus found, but connection inside circuit-breaker disturbed
	Red	Internal system bus fault

Fitting XCOM-DP module on the withdrawable unit

– Switching off and discharging the spring(→ page 24 – 2)

– Pull the circuit-breaker into maintenance position (→ page 24 – 3)



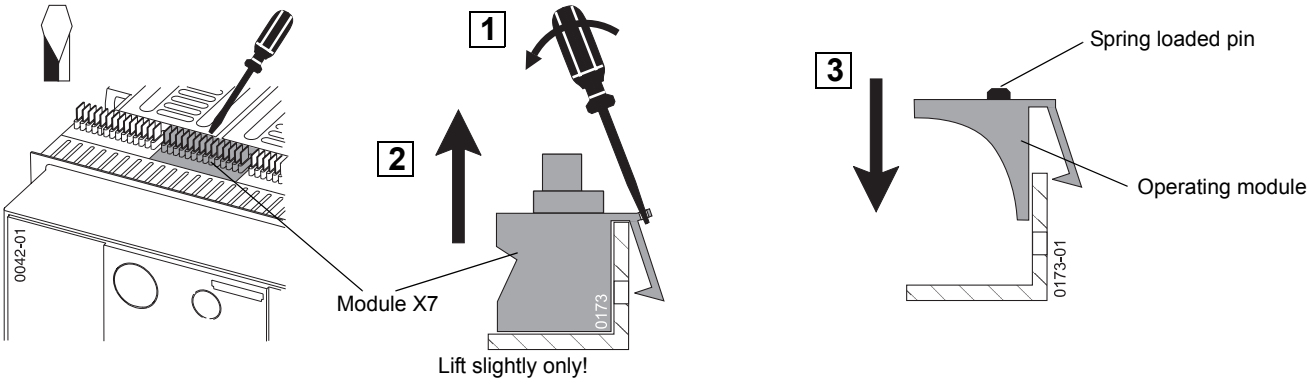


S46, S47 and S48:

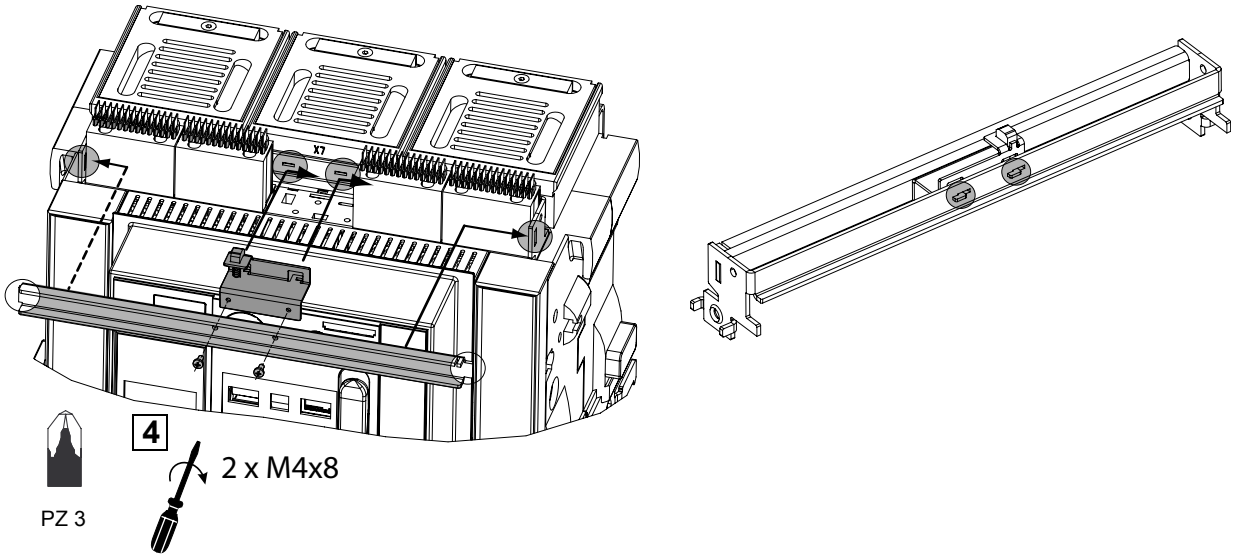
Signalling switches for detecting the circuit-breaker position in the withdrawable unit and transfer to PROFIBUS-DP and internal system bus.

Fitting operating module with reset pin on the circuit-breaker

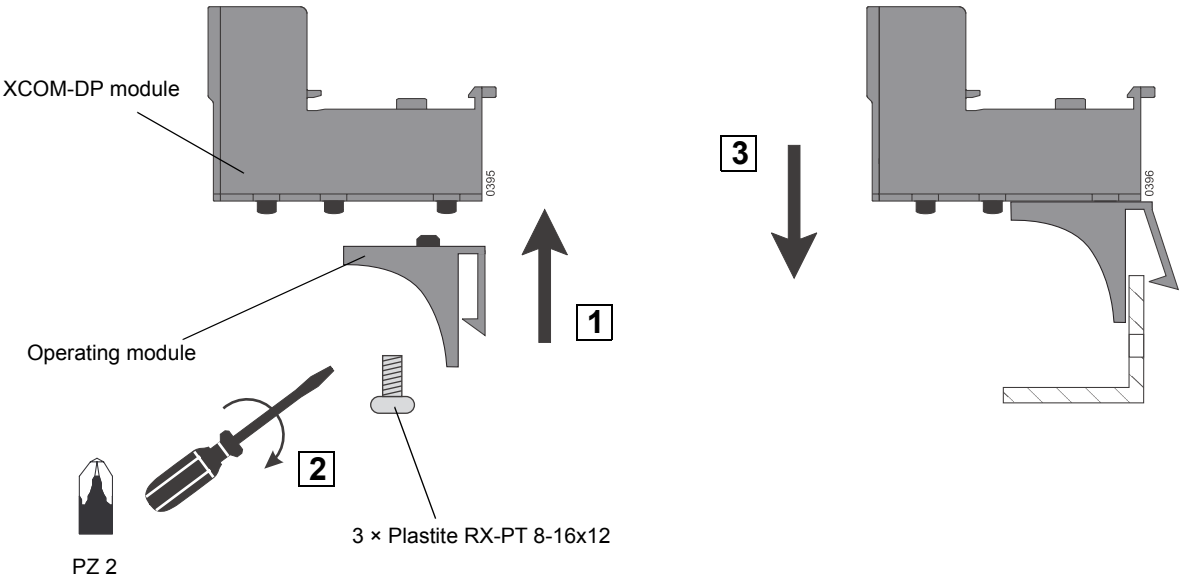
For actuating signalling switches S46, S47 and S48



For circuit-breakers with 1000 V rated voltage:



Fitting XCOM-DP module on the fixed-mounted circuit-breaker

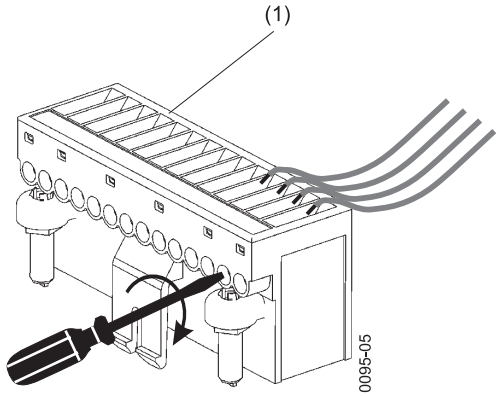


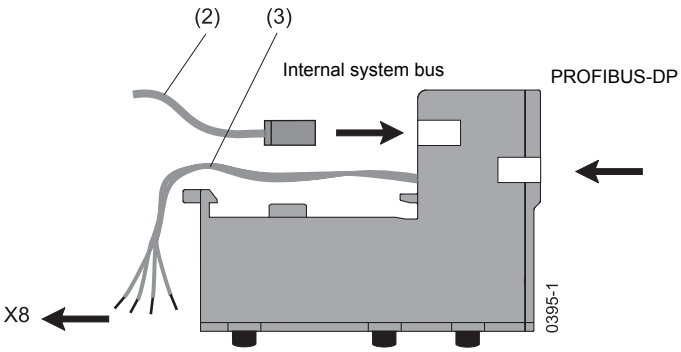
Connecting wires

→ Circuit diagrams (page 8 – 1)

Note

It may be necessary to retrofit missing control-circuit connections (knife contact rail, auxiliary plugs, sliding contacts for connection area).
→ (page 5 – 16).





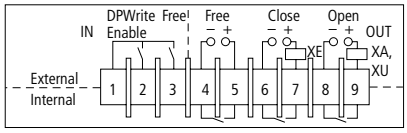
(1) Hand plug X8
(2) Connecting cable to first external expansion module or termination resistor
(3) Connecting cable to hand plug X8

Designation	Assignment	Terminal
X8-1	Internal system bus –	X8.1
X8-2	Internal system bus +	X8.2
X8-3	24 V DC +	X8.3
X8-4	24 V DC GND	X8.4

ATTENTION

If no external expansion modules are connected to the XCOM-DP module, the termination resistor has to be plugged in the terminal for internal system bus.
Otherwise there may be malfunctions in the electronic system.

Connections for additional inputs and outputs



DP Write Enable

Write protection: Without bridge at this input all activities which could change the circuit-breaker status are blocked.

“Free”

Free operator input, e.g. for the control of the remote reset XFR

“Close”

24 V DC contact for the remote control of the closing release

“Open”

24 V DC contact for the remote control of the shunt or undervoltage release

Further information about the application of these inputs and outputs is given in the “Communication manual circuit-breaker IZM”.

9.2.2.3 "Harmonic" measurement functions

Overcurrent releases XZMU and XZMD can be equipped with a metering function. This, however, requires external voltage transformers providing a three-phase metering voltage .(→ page 9 – 69).

In addition to the values for the currents, the metering function provides data on voltages, powers, energy values, power factors and frequency through the internal system bus, for further processing.

This data can be shown on the display of the overcurrent releases, transmitted to the PROFIBUS-DP through the XCOM-DP module and transferred to the outputs of external expansion modules. Based on this data, conclusions can be drawn about the condition of the power system.

A separate 24 V supply voltage is needed for applications where the full measurement functions are requiered when communication function is not selected.

Metering function – accuracy

Measured parameter	Accuracy[1)]
Currents I_{L1}, I_{L2}, I_{L3}, I_N	±1 %
Earth-fault current I_g (measurement with external earth-fault transformer class 1)	±5 %
Line voltages U_{L12}, U_{L23}, U_{L31}	±1 %
Phase voltages U_{L1N}, U_{L2N}, U_{L3N}	±1 %
Current average of line voltages $U_{avg\Delta}$	±1 %
Current average of phase voltages U_{avgY}	±1 %
Apparent power S_{L1}, S_{L2}, S_{L3}	±2 %
Total apparent power	±2 %
Active power P_{L1}, P_{L2}, P_{L3}	±3 % @ cos φ >0.6
Total active power	±3 % @ cos φ >0.6
Reactive power Q_{L1}, Q_{L2}, Q_{L3}	±4 % @ cos φ >0.6
Total reactive power	±4 % @ cos φ >0.6
Power factor cos φ_{L1}, cos φ_{L2}, cos φ_{L3}	±0.04
Power factor total cos φ_{avg}	±0.04
Long term average of currents L1, L2, L3	±1 %
Long term average of 3-phase current	±1 %
Long term average of active power in L1, L2, L_3	±3 % @ cos φ >0.6
Long term average of active power 3-phase	±3 % @ cos φ >0.6
Long term average of apparent power in L1, L2, L_3	±2 %
Long term average of apparent power 3-phase	±2 %
Long term average of reactive power 3-phase	±4 % @ cos φ >0.6
Energy consumed	±3 %
Energy delivered	±3 %
Reactive energy consumed	±4 %
Reactive energy delivered	±4 %
Frequency	±0.1 Hz
Distortion factor of current and voltage	±3 % upto 29. Harmonic
Phase unbalance of current and voltage[2)]	±1 %

The necessary configuration (input of current transformer primary and secondary voltage, phase rotation, positive energy direction and primary switching of the current transformers) can be carried out via:

– The test socket with the parameter assignment module XEM-PG(E)
– The graphical display (XZMD) (→ page 9 – 72)

Current on the display of the overcurrent release XZMU

Measured parameter	Accuracy[1)]
Currents I_{L1}, I_{L2}, I_{L3}, I_N	±10 %
Earth-fault current Ig (measurement with external earth-fault transformer)	±5 % + 16 LSD

1) **Definition of accuracy:**
g (x % w.r.t. upper limit + 2 LSD (Least Significant Digit)) for one year after calibration

Reference condition:

Input current I	$I_{n\ max}$ ±1 %
Input voltage U	U_n ±1 %
Frequency f	50 Hz
Power factor	cos φ = 1
Waveform	Sine, harmonic distortion ≦5 %, sysmetrical load
Ambient temperature	35 °C ±5 °C
Auxilliary voltage	DC 24 V according to DIN 19240/EN 61131
Warm-up time	2 hours
Relative humidity	up to 90 %
External fields	none

Metering range:

Current	0.2 … 1.2 $I_{n\ max}$
Voltage	0.8… 1.2 U_n

2) **IEC Definition:**
Ratio of the largest difference between the phases to the most heavily loaded phase.

Further protection functions

The metering function is used to implement extended protective functions beyond the functionality of the overcurrent releases.

Parameter	Setting range	Delay
Under voltage	100 – 1100 V	0 – 15 s
Over voltage	200 – 1200 V	0 – 15 s
Active power in normal direction	1…12000 kW	0 – 15 s
Active power in reverse direction	1…12000 kW	0 – 15 s
Over frequency	40 – 70 Hz	0 – 15 s
Under frequency	40 – 70 Hz	0 – 15 s
Phase current unbalance[1)]	5…50 %	0 – 15 s
Phase voltage unbalance[1)]	5…50 %	0 – 15 s
Phase rotation		
Distortion factor of current	3…50 %	5 – 15 s
Distortion factor of voltage	3…50 %	5 – 15 s

1) **IEC definition:**
The ratio of the largest difference between the phases to the most heavily loaded phase.

If one of these parameters exceeds or falls below its default settings, the overcurrent release is tripped after the adjusted delay through the internal system bus.

The parameters can be adjusted through:

– The test socket with the parameter assignment module XEM-PG(E)
– The PROFIBUS-DP with a PC and the system-software
– The graphical display (XZMD)

Setpoints

With the setpoint function it is possible to signal or record special events in the power system.

Parameter	Range	Delay
Phase overcurrent	30 – 10000 A	0 – 255 s
Ground overcurrent	30 – 1200 A	0 – 255 s
Neutral overcurrent	30 – 10000 A	0 – 255 s
Phase current unbalance[1)]	5…50 %	0 – 255 s
Current demand	30 – 10000 A	0 – 255 s
Under voltage	100 – 1100 V	0 – 255 s
Phase voltage unbalance[1)]	5…50 %	0 – 255 s
Over voltage	100 – 1100 V	0 – 255 s
Over power in normal direction	1 – 12000 kW	0 – 255 s
Reverse active power exceeded	1 – 12000 kW	0 – 255 s
Long term average active power exceeded	1 – 12000 kW	0 – 255 s
Long term average apparent power exceeded	1 – 12000 kVA	0 – 255 s
Long term average reactive power exceeded	1 – 12000 kVar	0 – 255 s
KVAR consumed	1 – 12000 kVar	0 – 255 s
Reactive power exceeded negative feeder	1 – 12000 kVar	0 – 255 s
KVA	1 – 12000 kVA	0 – 255 s
Over frequency	40 – 70 Hz	0 – 255 s
Under frequency	40 – 70 Hz	0 – 255 s
Under power factor (PF)	–0.001…0.001	0 – 255 s
Over power factor (PF)	–0.001…0.001	0 – 255 s
Current THD	3…50 %	0 – 255 s
Distortion factor voltage exceeded	3…50 %	0 – 255 s
Crest factor	1…2.55	0 – 255 s
Form factor	1…2.55	0 – 255 s

1) **IEC definition:**
The ratio of the largest difference between the phases to the most heavily loaded phase.

When one of these parameters exceeds or falls below the set value a signal is given via the internal system bus after the set time delay.

The parameters can be adjusted through:

– The test socket with the parameter assignment module XEM-PG(E)
– The PROFIBUS-DP with a PC and the system-software
– The graphical display (XZMD)

Additional functions

– Two independent waveform memories
– Harmonic analysis

The two independent waveform memories can be used to analyse the current and voltage values at the time of the event.

If the waveform memories are programmed to “recording” (standard setting), there is continuous recording until a previously defined event occurs. Then, the recording is stopped, and the current or voltage waveforms at the time of the event can be observed through a visual display (graphical LCD, laptop or PC). The time window is one second. The resolution is 1649 values/second

The values that can be selected for one of the waveform memories are:

Settings for waveform memory	
Currents	I_{L1}, I_{L2}, I_{L3}, I_{LN}, I_g
Voltages	U_{L1}, U_{L2}, U_{L3}

The waveform memories can also be started or stopped individually through the communication channels (PROFIBUS-DP, internal system bus).

The waveform memories can be parameterized through:

– The test socket with the parameter assignment module XEM-PG(E)
– The PROFIBUS-DP with a PC and the system-software
– The graphical display (XZMD)

Retrifitting the “harmonic” measuring function

Danger

Before working on the device be sure to switch off the switchboard and earth the device.

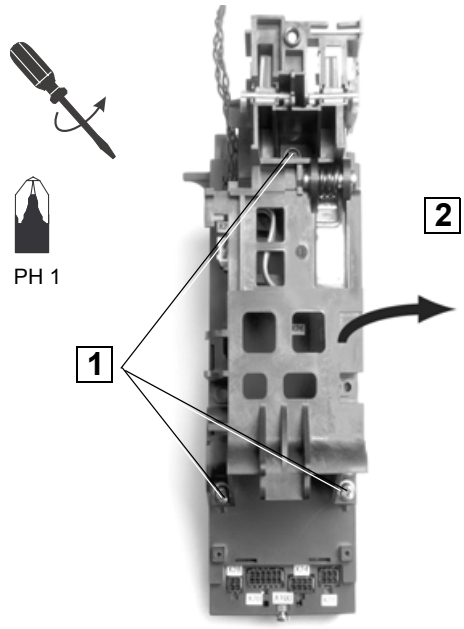
– Switching off and discharging the spring (→ page 24 – 2)
– Put the drawer switch to maintenance position (→ page 24 – 3)
– Remove front panel (→ page 24 – 6)
– Remove overcurrent release (→ page 9 – 39)

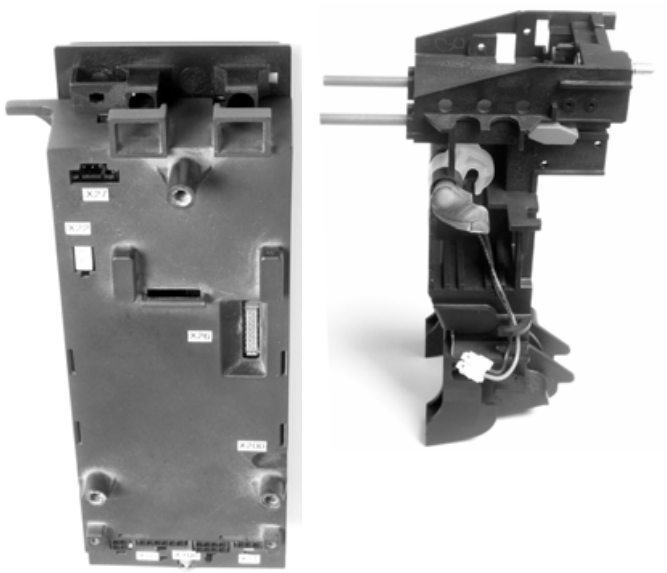
Note

If the metering function metering function “harmonic” is retrofitted, the metering function for current and voltage values is 3 %. The accuracy of the measured values alter correspondingly. If an accuracy of 1 % is required, the overcurrent release must be submitted to the manufacturer for calibration together with the metering function “power”/metering function “harmonic”.

Removing tripping mechanism from electronic overcurrent release

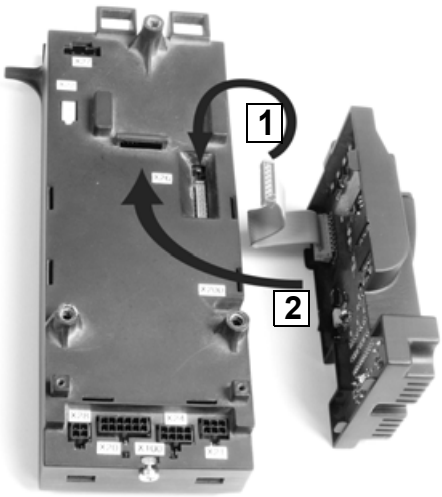
If applicable, undo existing cable fixings and unplug connector of tripping magnet.

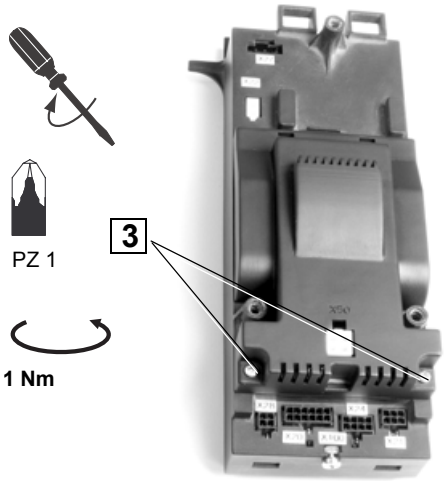




Installing metering function and screwing tight

CAUTION
Tighten self-tapping screws carefully!

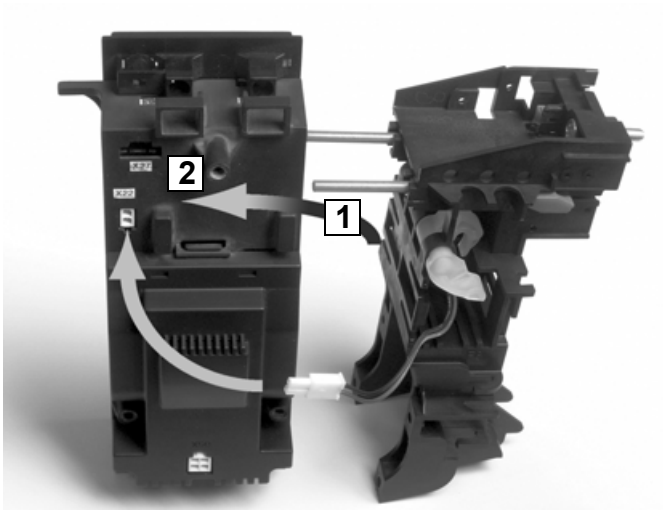


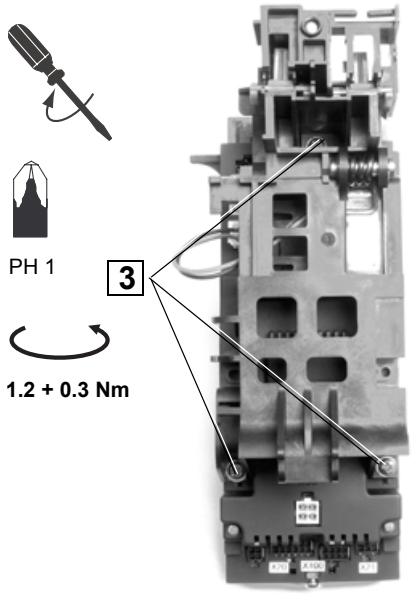


Installing mechanism and plugging connector for tripping coil

CAUTION

Avoid twisting of the anti-shock mounting! Observe tightening torque.



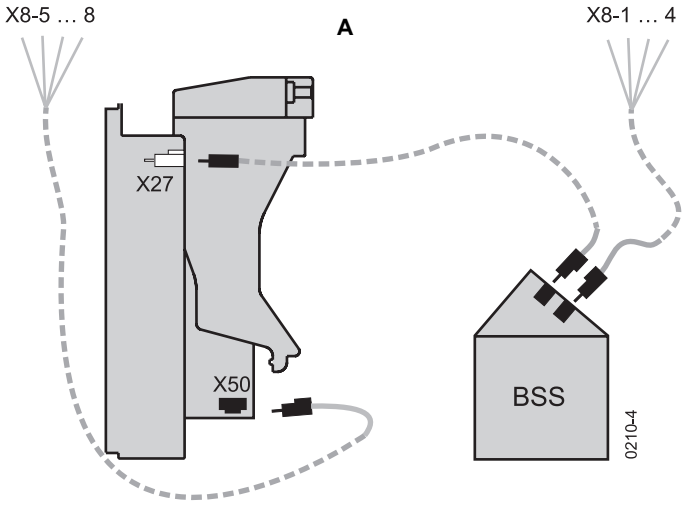


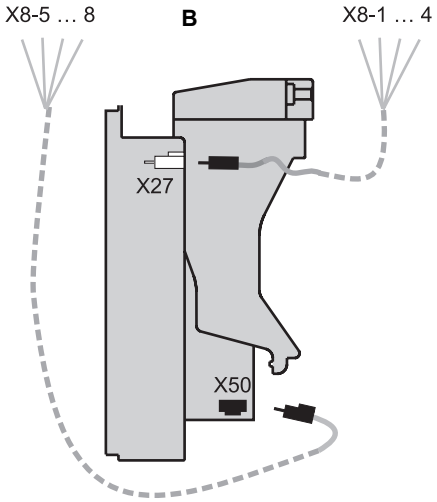
Connecting pre-assembled cables

Note

It may be necessary to retrofit missing control-circuit connections (knife contact rail, auxiliary plugs, sliding contacts for connection area)(→ page 5 – 19).

Connection variant A: with XBSS
Connection variant B: without XBSS



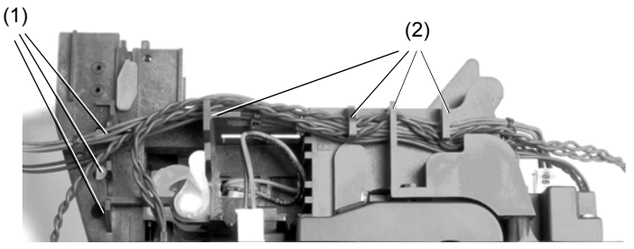


Terminal assignment	
X50	External voltage transformer
X27	System bus

Note

If no external expansion modules are connected to X8-1 and X8-2, this terminals must be equipped with the end resistor.
Otherwise there may be malfunctions in the electronic system.

Laying and fixing the cables



(1) 3 holes as fixing points
(2) Fixing aids

Lay all cables carefully as shown above and fix them with cable straps at the fixing points. Lead the cables around the fixing mandrel and fix them directly on the left and to the right of it with cable straps.

Then:

- Mount overcurrent trip in reverse order to removal (→ page 9 – 39)
- Connect cables to X8
- Fit front panel (→ page 24 – 13)

9.2.2.4 Retrofitting the PROFIBUS-communication connection

The circuit-breaker can be retrofitted using the “PROFIBUS retrofit kit” so that it is capable to transfer data via the PROFIBUS-DP.

- Mounting of the Breaker Status Sensors (XBSS) (→ page 9 – 47)
- Mounting of the XCOM-DP-Modules (→ page 9 – 61)
- Exchange of the overcurrent releases XZMA, XZMV or XZMV+XT for XZMU or XZMD (→ page 9 – 1)

Note

It may be necessary to retrofit missing control-circuit connections (knife contact rail, auxiliary plugs, sliding contacts for connection area) (→ page 5 – 19)

Ordering references

	Part no.
Electronic overcurrent release	
– System protection	IZM-XZMA
– Selectivity protection	IZM-XZMV
– Selectively-opening circuit-breakers with earth-fault protection and neutral conductor protection	IZM-XZMV-XT
– Universal	IZM-XZMU
– Universal with measuring function “harmonic”	IZM-XZMU-MH
– Digital	IZM-XZMD
– Digital with measuring function “harmonic”	IZM-XZMD-MH
Internal wiring for retrofit (necessary with release upgrade) (→ page 9 – 39)	
– For upgrade from release XZMA(V) to release XZMU(D)	IZM-XZM-VLIS[1)]
– For the connection of external N and/or G current transformer to release XZMU(D)	IZM-XZM-VLEW[2)]
Metering function “harmonic” (without voltage transformer)	+ IZM - XMH
Communication switch-on PROFIBUS-DP (COM-DP and BSS module)	(+) IZM - XCOM - DP[3)]
Separate Breaker Status Sensor (BSS)	(+) IZM - XBSS[3)]
COM-DP module (without BSS module)	IZM - XCOM - DP[3)]

1) With release upgrade, the necessary wiring “Internal system bus” between release and X8 (→ X8: 1-4), when communication function or external 24 V DC power supply is used.

2) With release upgrade, the necessary wiring between release and X8 (→ X8: 9-12), when neutral conductor protection or earth-fault protection is required.

3) With the use of the communication module there is no possibility to install the auxilliary contacts IZM XHIA, XHIF, XHIS and XHIS1. The corresponding signals can be seen internally by the Breaker Status Sensor and can be read with the parameter device, via the extention module or PROFIBUS.

Note

The above ordering references are for single ordering for replacement purposes. When ordering give the Ident Number of the circuit-breaker!

The internal wiring IZM-XZM-VLIS(-VLEW) must, when required, be ordered seperately.

The upgrading of a switch-disconnector is possible using the Eaton After Sales Service.

For the releases IZM-XZMU(...) and IZM-XZMD(...) the auxilliary plug X8 is necessary. When not present, the auxilliary plug IZM-XKL(Z)(-AV) must also be ordered. Terminal assignment (→ page 8 – 1)

The release accessories (incl. IZM-XRP...) must be separately ordered.

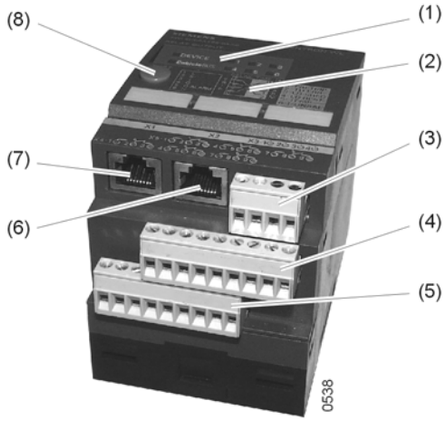
The release upgrade from 4 pole IZM with XZMA(V) to XZMV(U)(D) with neutral conductor or earth-fault protection an additional external measurement transformer IZM...-XW... must be used. (→ page 9 – 67)

9.2.3 External expansion modules

9.2.3.1 General

Application

External expansion modules are used for communication between the circuit-breaker IZM and the secondary equipment in the circuit-breaker panel. They are provided to control analog indications, transmit the circuit-breaker tripping status and the tripping reason, and to read additional control signals. Furthermore, with one of these modules it is possible to implement a zone selective interlocking for short-circuit protection.



(1) Indication LED
(2) Rotary coding switch
(3) Connection X3: internal system bus
(4) Connection X5: inputs or outputs
(5) Connection X4: inputs or outputs
(6) Connection X2: internal system bus
(7) Connection X1: internal system bus
(8) “TEST” button

Connection allocation X3	
X3-1	24 V DC GND
X3-2	System bus -
X3-3	System bus +
X3-4	24 V DC +

Mounting

The external expansion modules are snapped on a standard 35-mm DIN-rail inside the switchgear panel. Please observe that the length of the connecting cable from the first module to the circuit-breaker does not exceed 2 m.

Connection establishment

To connect expansion modules between each other and to the circuit-breaker, the supplied pre-assembled cables must be used. These cables are also used for the 24 V DC voltage supply of expansion modules.

Should more than 2 system bus modules be connected they must be supplied with 24 V DC with a seperate cable connection from module to module.

Note

It may be necessary to retrofit missing control-circuit connections (knife contact rail, auxiliary plugs, sliding contacts for connection area).
(→ page 5 – 16).

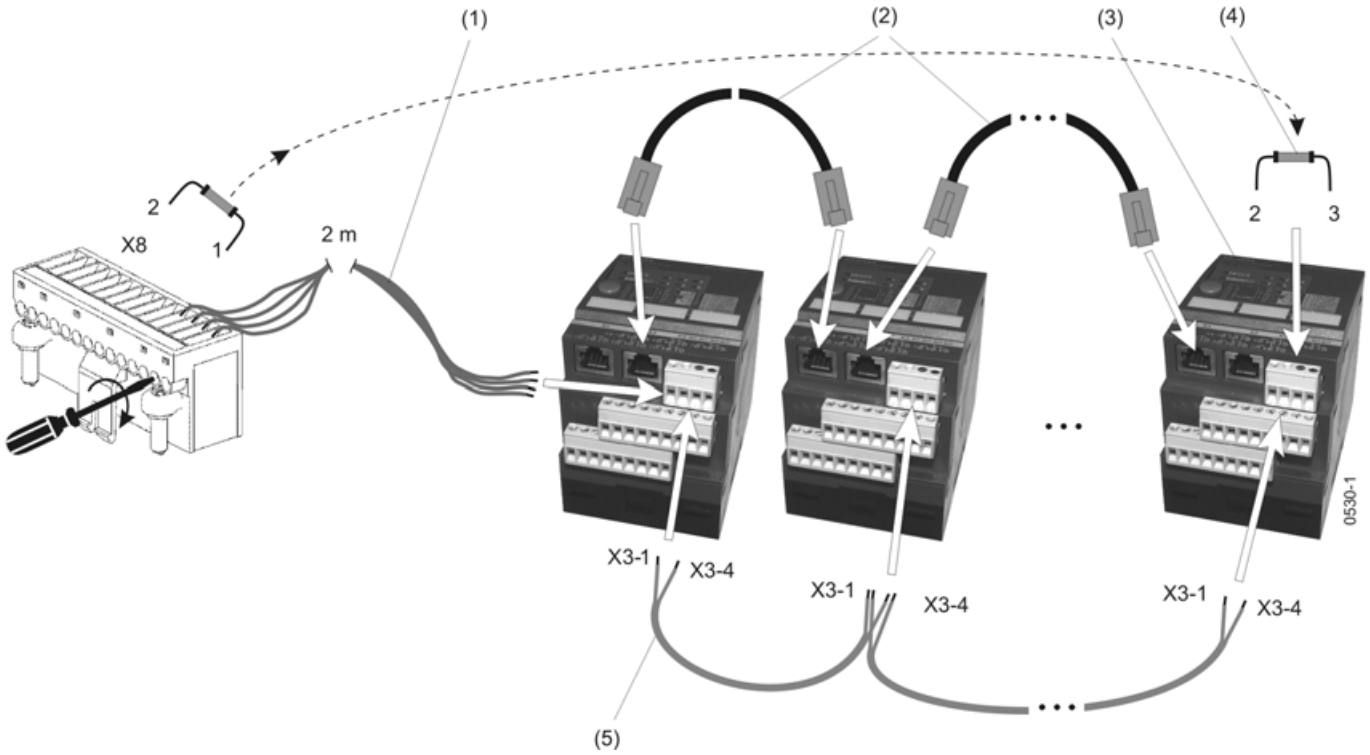
Only one expansion module can be connected directly to a circuit-breaker. Further modules have to be connected from module to module. Radial cables are not permissible!

If provided, the ZSI-module is always the first module, and it must be connected directly to the circuit-breaker.

On the last module, the system bus cable must be connected to X3 with a 120 Ω resistor, which is integrated in a western plug and is supplied with each module.

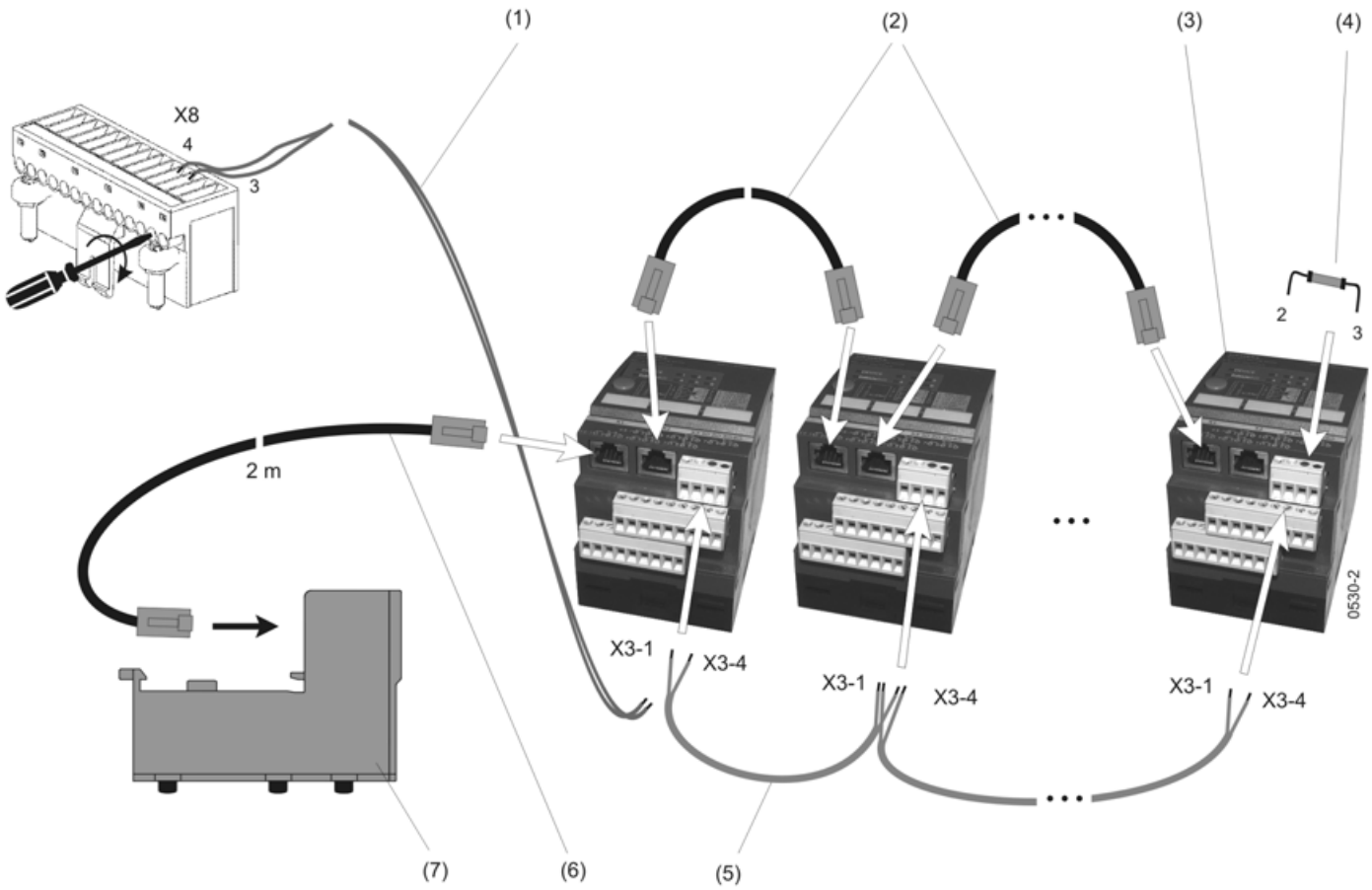
The total length of the systembus conductor must not exceed 9 m from the circuit-breaker auxiliary plug X8 to the last expansion module.

Circuit-breaker without XCOM-DP-module



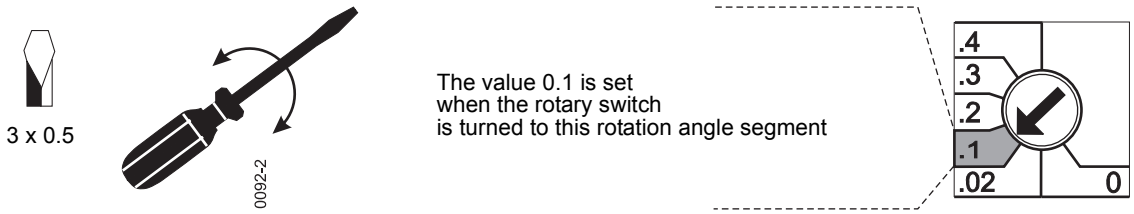
(1) Connecting cable to 1st module (4-core, cores X8-4/X3-1 twisted with X8-3/X3-4 and X8-1/X3-2 twisted with X8-2/X3-3)
(2) Connecting cables between modules
(3) System bus module
(4) Terminating resistor 120 Ω 0.5 W on last module
(5) Cable connection for power supply with 24 V DC

Circuit-breaker with XCOM-DP-module



(1) **Only for more than 2 system bus modules:**
Connection cable between X8 and the first system bus module with 24 V DC power supply.
(2) Connecting cables between system bus modules
(3) System bus module
(4) Terminating resistor 120 Ω 0.5 W on last module
(5) Connection cable between the system bus modules with 24 V DC power supply
(6) Connection cable between COM-DP and 1st systembus module (with two Western plugs)
(7) COM-DP

Setting principle



Indications

LED	Indicator	Significance
DEVICE	Green	Module in operation
	Yellow	Module in test mode
	Red	Module faulty
Internal system bus	Green	Connection to internal system bus present
	Off	No connection to internal system bus
All other LEDs	Yellow	Option set or signal available
	Off	Option not set or no signal available

Module test

CAUTION

To avoid malfunctions of the circuit-breaker or one of its components, perform the test before commissioning only.

The perfect operation of the expansion modules can be verified in the test mode.

The test mode is started by pressing the “TEST” button once.

All outputs and the associated LEDs are switched off. The colour of the DEVICE LED changes from green to yellow.

Testing inputs and outputs

Pressing the “TEST” button	Reaction
Twice short one after the other	– LED 1 on – in/output 1 on
After a pause, Twice short one after the other	– LED 1 and in/output 1 off, LED 2 on – in/output 2 on
After a pause, Twice short one after the other	– LED 2 and in/output 2 off, LED 3 on – in/output 3 on
…	…
After a pause, Twice short one after the other	– LED 5 and in/output 5 off, LED 6 on – in/output 6 on
After pause once	in/output 6 off, all LEDs on
1 x	Test mode starts again from beginning, all inputs/outputs and the associated LED's are off

If the “TEST” button is pressed quickly and successively several times with the LED on, this will switch the corresponding input/ output on and off alternately.

Testing LEDs only

If the “TEST” button is pressed several times with pauses in-between, the LEDs are only switched on one after the other. After the last LED, all LEDs are switched on.

Repeated pushing of the button “TEST” starts the test mode again, and all LEDs as well as inputs/outputs are off.

Quitting the test mode

Do not press the “TEST” button for about 30 s.

If all LEDs are on, the test mode is already quitted after about 1 s.

9.2.3.2 ZSI module

Function

If the circuit-breaker is combined with a ZSI-module, a short-circuit occurring in systems with several grading levels can be localised precisely.

For this purpose, all circuit-breakers are interconnected through their ZSI-modules.

In case of short-circuit, each circuit-breaker affected by the short-circuit current interrogates its downstream circuit-breaker to determine fault presence at this downstream level. In the direction of the energy flow, only the circuit-breaker nearest to the short-circuit trips. A possible time delay setting for the short-circuit tripping is deactivated. However, tripping will not take place until 50 ms later at the earliest, as a rule it will take 80 –90 ms.

Mounting

(→ page 9 – 59)

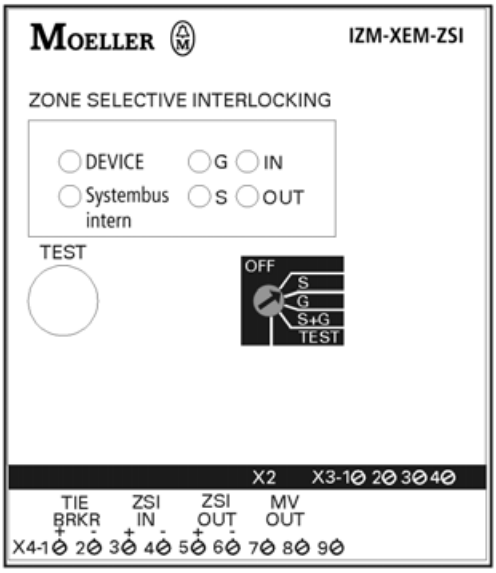
Connection

→ Connection establishment (page 9 – 59)

Only one ZSI-module can be connected per circuit-breaker.

If the ZSI-module is used together with other expansion modules, the ZSI-module must be connected directly to the XCOM-DP-module or the hand plug X8.

Connection assignment



Terminal	Connection
TIE BRKR	Only for special applications;Allows complete ZSI function in systems with bus-couplers without additional components.
ZSI IN	ZSI-modules of lower-level circuit-breakers
ZSI OUT	ZSI-modules of higher-level circuit-breakers
MV OUT	Signal to the medium-voltage level

Observe the specified polarity when connecting: plus to plus and minus to minus!

The maximum length of cable for the ZSI wiring, for a cross-section of 0.75 mm2 (2 wires), is max. 400 m. With ZSI connection exclusively between WL switches and with an increase in cross-section to 2.5 mm2 a cable length of up to 1000 m is permissable.

The ZSI must be either with twisted pair cable or with screened cable.

The ZSI-module allows connection of up to:

– 8 circuit-breakers at the ZSI IN input and
– 20 circuit-breakers at the ZSI OUT output

Settings

→ Setting principle (page 9 – 61)

Settings ZSI-module	
OFF	ZSI-function deactivated
S	ZSI-module effective only for short-time delay short-circuit
G	ZSI-module effective only for earth-fault protection
S+G	ZSI-module effective only for short-time delay short-circuit and earth-fault
TEST	Test position for checking the ZSI functionality

Indications, tests

(→ page 9 – 62)

9.2.3.3 Digital input module

Function

With the digital input module, up to 6 additional binary signals (24 V DC) can be connected to the system.

These input signals are transferred to the PROFIBUS-DP via the internal system bus and can be evaluated accordingly.

For the overcurrent release XZMD, it is alternatively possible to use such an input signal at the input 1 to switch over between two different protection parameter sets that may have been provided.

Mounting

(→ page 9 – 59)

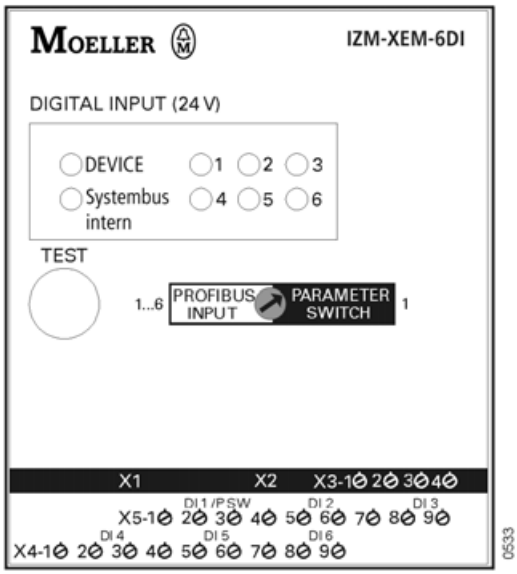
Connection

→ Connection establishment (page 9 – 59)

A maximum of two digital input modules can be operated on the internal system bus at the same time

– 1 module with the setting “PROFIBUS-DP INPUT”
– 1 module with the setting “PARAMETER SWITCH”

Connection assignment



Terminal assignment of digital input module	
X5	Inputs 1 – 3
X5 – 2.3	Input DI1
X5 – 5.6	Input DI3
X5 – 8.9	Input DI3
X4	Inputs 4 – 6
X4 – 2.3	Input DI4
X4 – 5.6	Input DI5
X4 – 8.9	Input DI6

The polarity of the input is not important.

Settings

→ Setting principle (page 9 – 61)

Settings of digital input module	
PROFIBUS-DP INPUT	Inputs 1 – 6 are active. If an input signal is present, a respective signal is output on the PROFIBUS-DP via the XCOM-DP module.
PARAMETER SWITCH	Input 1 is used for parameter switchover, all other inputs can be freely used. No input signal (LED 1 not on): Parameter set A activated Input signal available (LED 1 on): Parameter set B activated

Note

The parameter changeover command can be given by a command via the bus communication, the XEM-PG or via the graphic display.

For further details see “IZM communication solutions” manual.

Indications

(→ page 9 – 62)

Testing

(→ page 9 – 62)

9.2.3.4 Digital output modules

Function

With digital output modules, up to 6 signals can be transmitted.

If the overcurrent release signals an event, the associated LED lights up after the adjusted time delay has elapsed, and the module sets a signal at the corresponding output.

Digital output modules are available in the following versions:

– With rotary coding switch and relay outputs
– Configurable and with relay outputs

Mounting

(→ page 9 – 59)

Connection

→ Connection establishment (page 9 – 59)

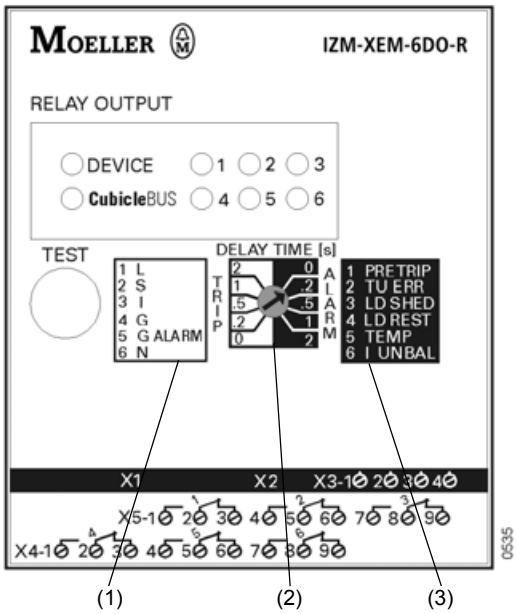
If a combination of digital output modules with rotary coding switch and configurable digital outputs has to be connected to a circuit-breaker, the following can be connected per circuit-breaker:

– 1 digital output module with rotary coding switch and output assignment 1
– 1 digital output module with rotary coding switch and output assignment 2
– 1 configurable digital output module

A mixed application of digital output modules with relay outputs and optocoupler outputs is possible.

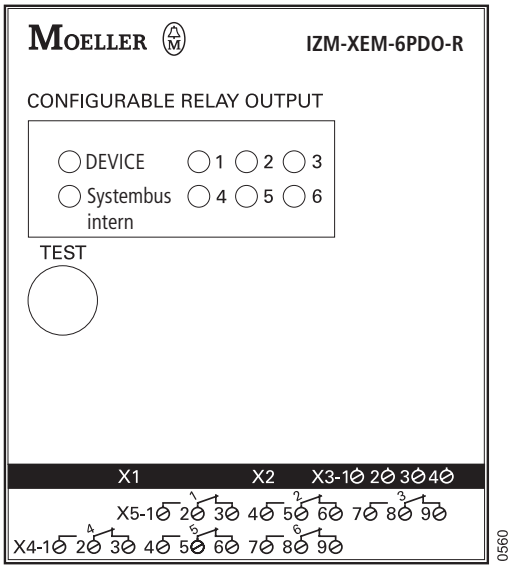
Terminal assignment

Digital output module with rotary coding switch



(1) Output assignment 1
(2) Time delay setting
(3) Output assignment 2

Configurable digital output module



Terminal assignment of digital output module	
X4	Outputs 4 – 6
X5	Outputs 1 – 3

Digital output modules with relay output provide changeover contacts at their outputs.

Current carrying capacity of the outputs	
Relay output	AC15: 250 V AC, 6 A DC13: 24 V DC, 2 A DC13: 250 V DC, 0.2 A

Settings

Digital output modules with rotary coding switch

→ Setting principle (page 9 – 61)

Terminal assignment 1 (TRIP)	
L	Signalling contact overload tripping
S	Signalling contact short-time delay short-circuit tripping
I	Signalling contact instantaneous short-circuit tripping
G	Signalling contact earth-fault tripping
G ALARM	Signalling contact earth-fault alarm
N	Signalling contact neutral conductor tripping

Time delay setting	
TRIP	0 – 2 s
ALARM	0 – 2 s

The time delay setting determines how long a signal of the overcurrent release must be available until the associated LED lights up and the signal is set at the corresponding output.

Output assignment 2 (ALARM)	
PRE TRIP	Signalling contact leading signal overload tripping(time delay 0 s)
TU ERR	Signalling contact trip unit error

Output assignment 2 (ALARM)	
LD SHED	Signalling contact load shed(time delay 0 s)
LD REST	Signalling contact load restore(time delay 0 s)
TEMP	Signalling contact temperature alarm
I UNBAL	Signalling contact phase unbalance current

Configurable digital output modules

Configurable digital output modules can be adjusted through:

– The test socket of the overcurrent release with the parameter assignment module XEM-PG(E)
– 13 the PROFIBUS-DP with data set DS 69 Bytepos.

Indications

(→ page 9 – 62)

Testing

(→ page 9 – 62)

9.2.3.5 Analog output module

Function

With the analog output module, analog measured-values can be transmitted, which can be shown on the cubicle door by means of moving-coil instruments. There are a total of 4 outputs available.

For the output signal, two different formats can be selected:

– 4...20 mA, output via plug X5
– 0...10 V, Output via plug X4.

Mounting

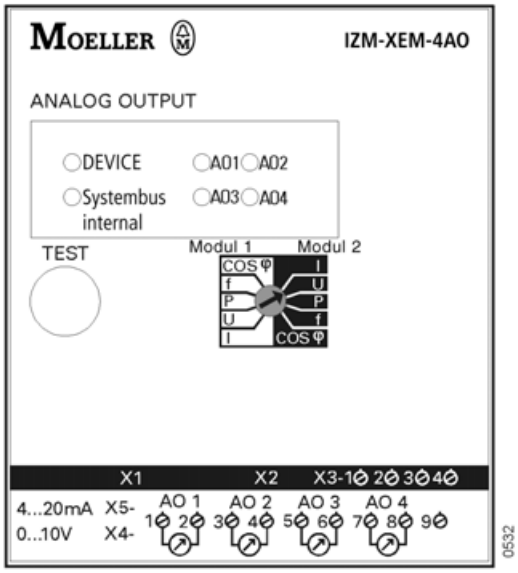
(→ page 9 – 59)

Connection

→ Connection establishment (page 9 – 59)

A maximum of 2 analog output modules can be connected, whose rotary coding switches, however, must have a different setting (module 1 or module 2).

Terminal assignment



Settings

→ Setting principle (page 9 – 61)

The measured-values to be signalled are adjusted with the rotary coding switch. They are always available at the two terminal strips in the corresponding format.

The following values are available at the outputs:

Output assignment				
Position	**AO 1**	**AO 2**	**AO 3**	**AO 4**
I	I_{L1}	I_{L2}	I_{L3}	I_N
U	U_{L12}	U_{L23}	U_{L31}	U_{L1N}
P	P_{L1}	P_{L2}	P_{L3}	S_{total}
f	f	U_{LLavg}	P_{total}	cos φ_{avg}
cos φ	cos φ_{L1}	cos φ_{L2}	cos φ_{L3}	Phase unbalanced current in %

Indications

(→ page 9 – 62)

Testing

(→ page 9 – 62)

9.2.3.6 Article numbers

Each expansion module is supplied with a termination resistor 120 Ω, integrated in a western plug, and with a connecting cable 0.2 m for connection to the internal system bus.

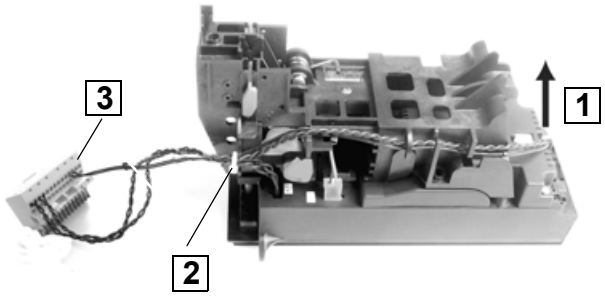
Expansion module	Part no.
ZSI-module	IZM-XEM-ZSI
Analog output module	IZM-XEM-4AO
Digital output module with relay output	IZM-XEM-6DO-R
Digital output module with relay output, programmable	IZM-XEM-6PDO-R
Digital input module	IZM-XEM-6DI
Pre-assembled cable 1 m	IZM-XEM-VL1
Pre-assembled cable 2 m	IZM-XEM-VL2
Pre-assembled cable 0.2 m	IZM-XEM-VL05

9.3 Current transformer

9.3.1 Retrofitting the internal neutral CT

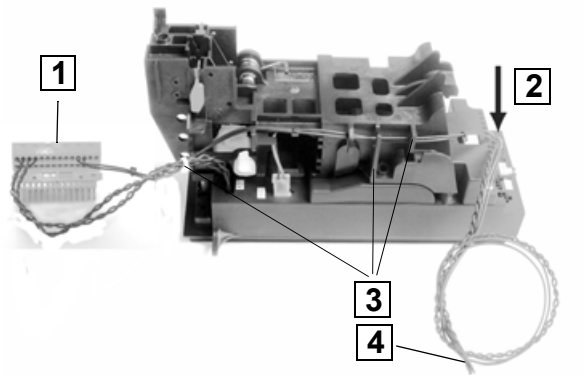
– Switching off and discharging the spring(→ page 24 – 2)
– Dismount the fixed-mounted circuit-breaker (→ page 5 – 1) or remove the circuit-breaker from the withdrawable unit (→ page 24 – 3)
– Remove front panel (→ page 24 – 6)
– Remove overcurrent release (→ page 9 – 39)

Disconnecting the cable harness from the overcurrent release



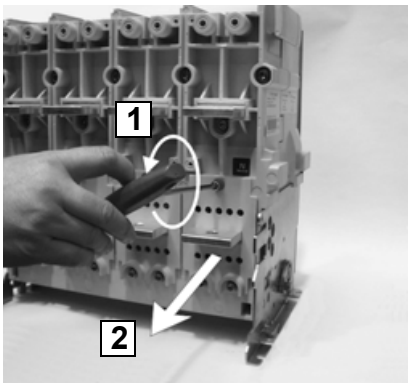
1 Unplug connector from X24
2 Remove cable binders
3 Disconnect cables from terminals 9 to 12 on the connector X8

Connecting new cable harness to the overcurrent release



1 Connect cable terminals X8-11 and X8-12 to terminals 11 and 12 on the connector X8
2 Plug connector to X24
3 Fasten the cables with the cable ties (→ page 9 – 57)
4 Connect plug with N CT in circuit-breaker

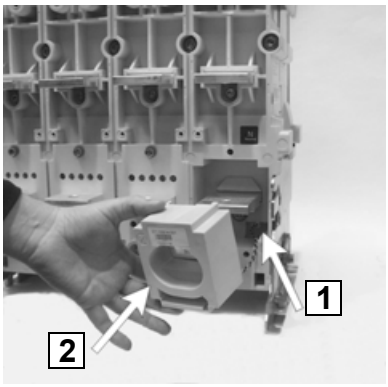
Removing rear cover of neutral CT compartment

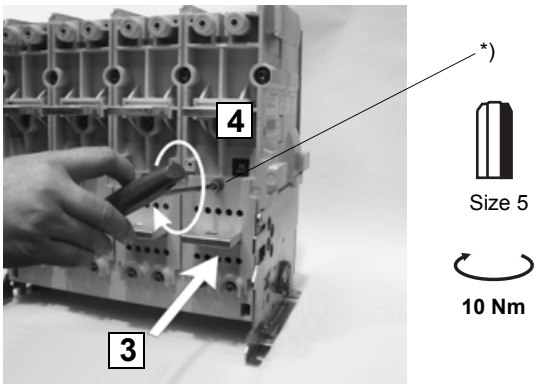



Size 5

1 Remove screws
2 Take off the rear cover

Inserting neutral CT





1 Push the CT terminal plug into the cable duct
2 Insert CT
3 Replace rear cover of CT compartment
4 Fasten the screws

***) Self-tapping screw only 5 Nm**

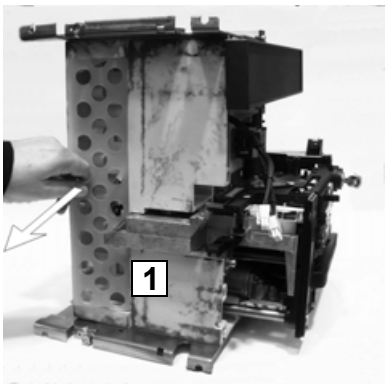
CAUTION

When using self-tapping screws don´t damage the screw thread!

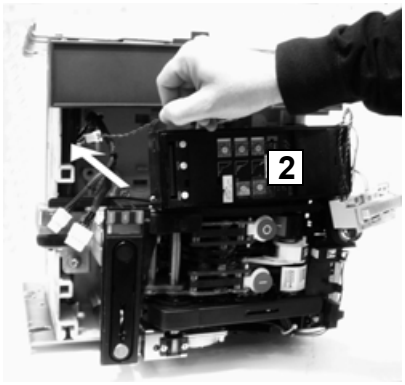
Insert the screws as follows:
– Insert screw
– turn by hand anti-clockwise until the screw-thread is found
– screw in
– using torque wrench fix to 5 Nm.

Connecting the neutral CT

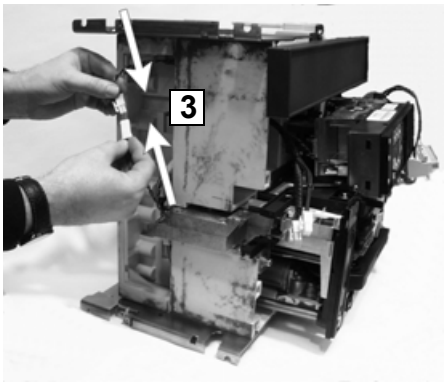
Lay the circuit-breaker on its right side



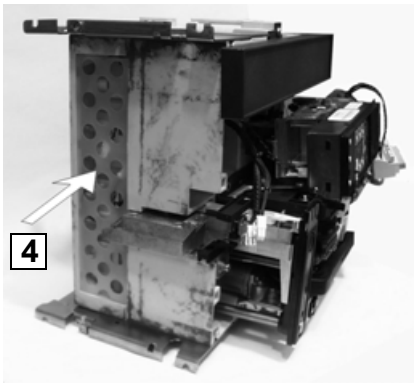
1 Remove cover of cable duct



2 Place the overcurrent release suitably and push the free connector of the cable harness into the cable duct



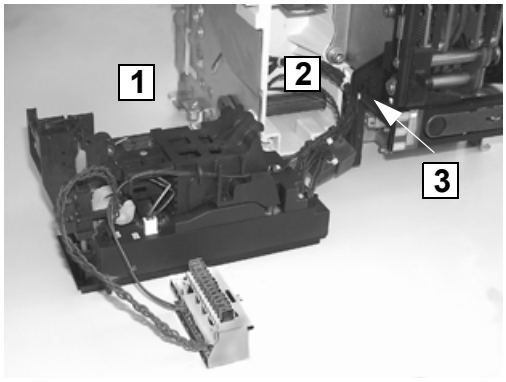
3 Plug the connector of the cable harness into the connector of the neutral CT



4 Place the joined connectors in the cable duct and replace the cover on the cable duct

Connection on overcurrent trip plug

Fix the overcurrent release and place the circuit-breaker upright



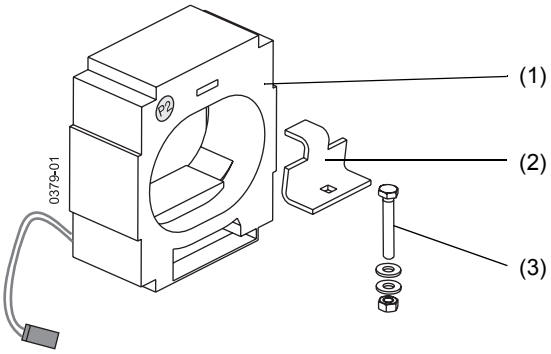
1 Place the overcurrent release in front of the circuit-breaker as shown
2 Plug the connectors to X20 and X21
3 Fasten the cables with the binders

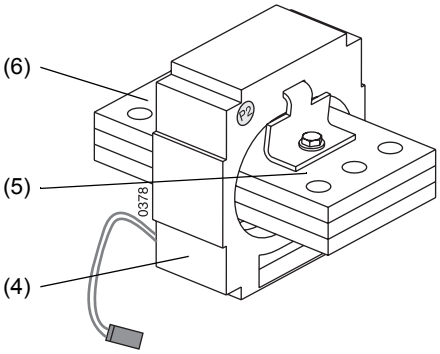
Then:

– Remount the overcurrent release (→ page 9 – 39)
– Install front panel (→ page 24 – 13)
– Install the fixed-mounted circuit-breaker (→ page 5 – 1) or place the circuit-breaker in the withdrawable unit and rack into connected position (→ page 6 – 1)

9.3.2 External current transformer for neutral conductor

Note
The secondary connection cables from neutral CT to circuit-breaker must be twisted!



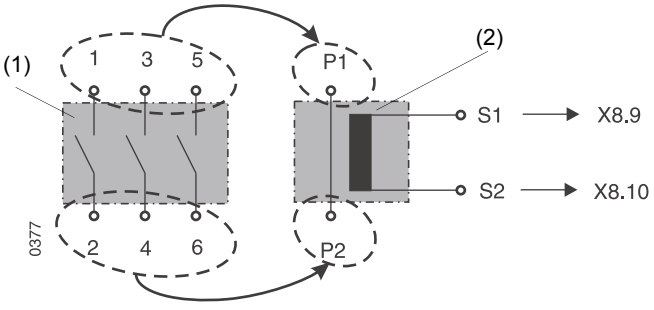


(1) Version for copper bar on switchboard side
(2) Mounting bracket
(3) Bolt M6 with washer and nut
(4) Version with copper connection pieces
(5) Terminal P2
(6) Terminal P1

→ Dimension drawings (page 7 – 14)

Terminal assignment

Remove the bridge X8.9 - X8.10



(1) Power circuit
(2) External sensor for neutral

This arrangement ensures the same direction of the current flow for the circuit-breaker and the external neutral CT.

Ring-type transformer	Part no.
IZM…1-…	IZM1-XW
IZM…2-…	IZM2-XW
IZM…3-…	IZM3-XW

Transformers with copper connection	Part no.
IZM…1-…	IZM1-XWC
IZM…2-…	IZM2-XWC
IZM…3-…	IZM3-XWC

Note

It may be necessary to retrofit missing control-circuit connections (knife contact rail, auxiliary plugs, sliding contacts for connection area).
→ (page 5 – 16)

9.3.3 Voltage transformers

Voltage transformers are necessary for voltage measuring by the metering function.

The voltage transformers from serial number 980102XXXXXX have an internal primary and secondary star-point.

The voltage transformers can be snapped onto a standard 35 mm tophat rail inside the switchboard. Horizontal or vertical mounting is possible.

When vertical mounted an end stop stops the voltage transformer from slipping onto the bars.

The accuracy of the voltage transformer is dependant upon the number of connected measuring functions per voltage transformer :

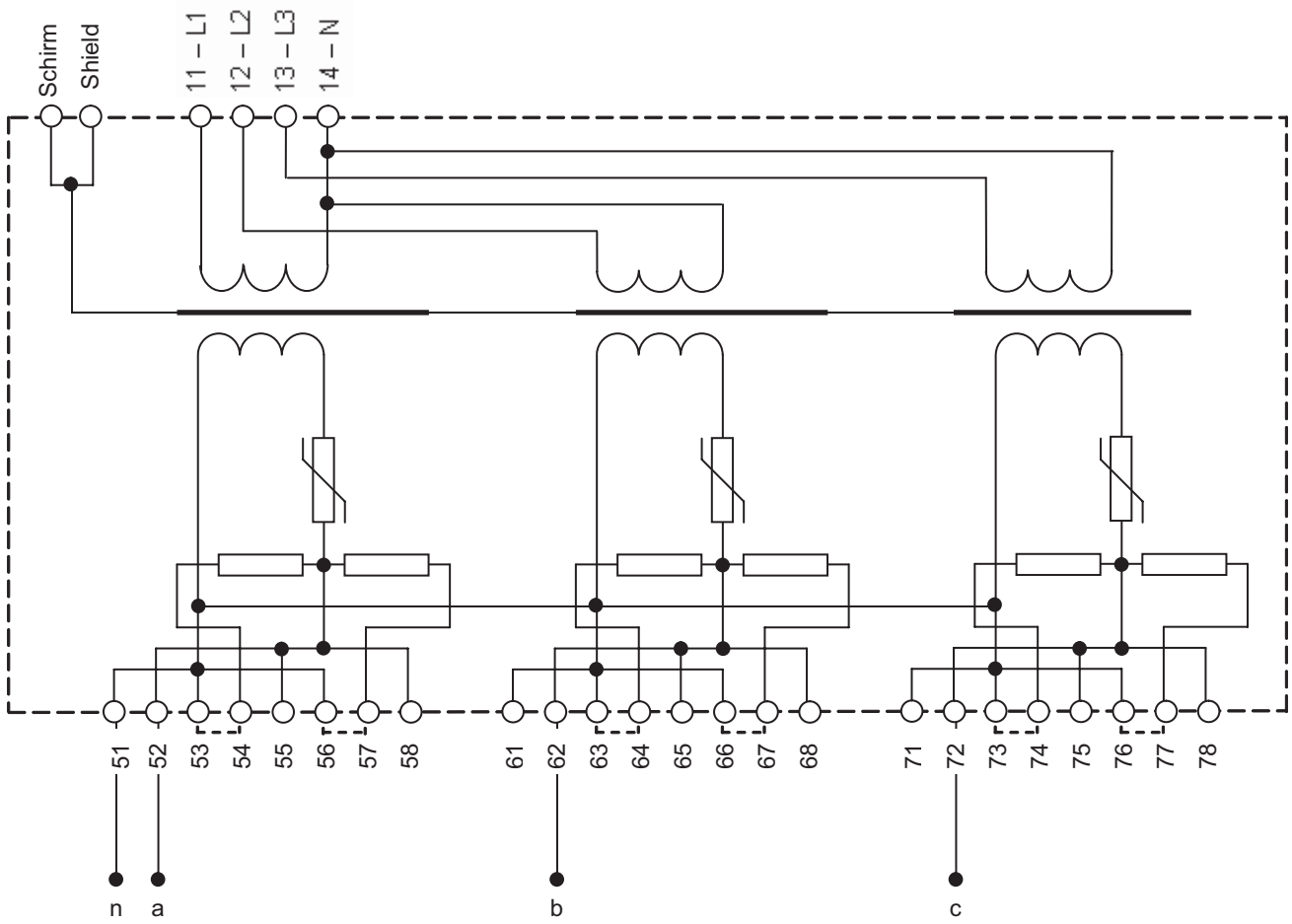
– Class 0.5for 1 - 3 measuring functions
– Class 3for 4 - 6 measuring functions

This data is applicable for ambient temperatures from 30 - 50 °C and a primary voltage from 80 - 120 % U_n for a duration of one year.

CAUTION

Before performing insulation tests in the switchboard the primaries of the voltage transformers must be disconnected from the power supply.

Wiring diagram



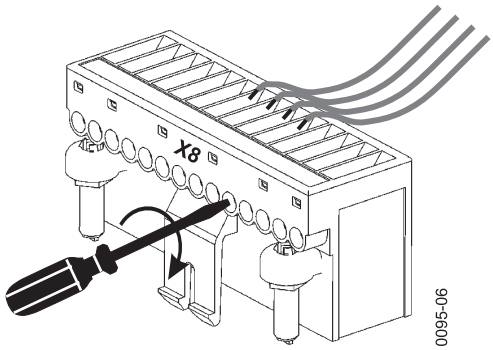
Voltage transformer type: IZM-XW380-690AC

Designation Voltage (conductor-conductor) 380 – 690 V AC	**Primary** Terminal	**Secondary** Terminal
Phase L1	11	52
Phase L2	12	62
Phase L3	13	72
N	14	51, 61, 71
Screen[1)]	S	

1) Connect the screen of the voltage transformer to the earth point (PE potential) of the switchboard (minimum cross section = 2.5 mm²)

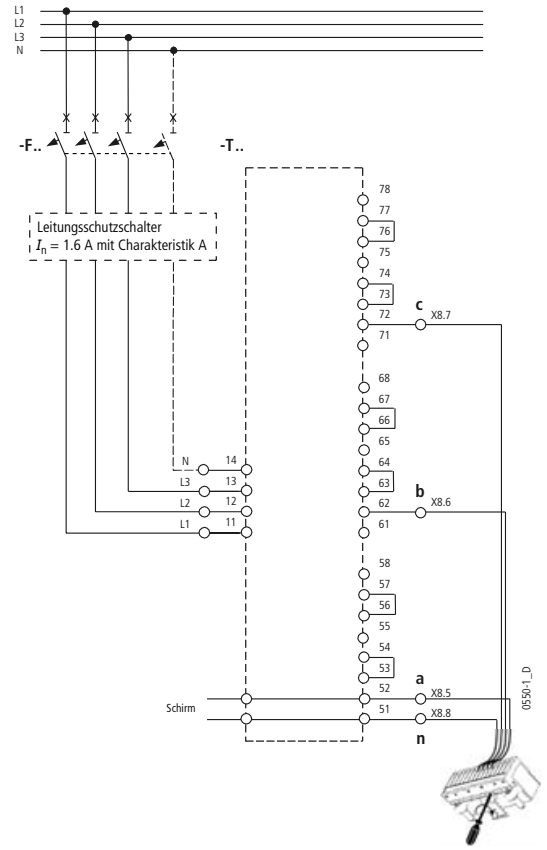
Number of measuring functions	**Phase L1/a** bridge	**Phase L2/b** bridge	**Phase L3/c** bridge
1	53 – 54 56 – 57	63 – 64 66 – 67	73 – 74 76 – 77
2	56 – 57	66 – 67	76 – 77
3 – 6	–	–	–

Connection to IZM

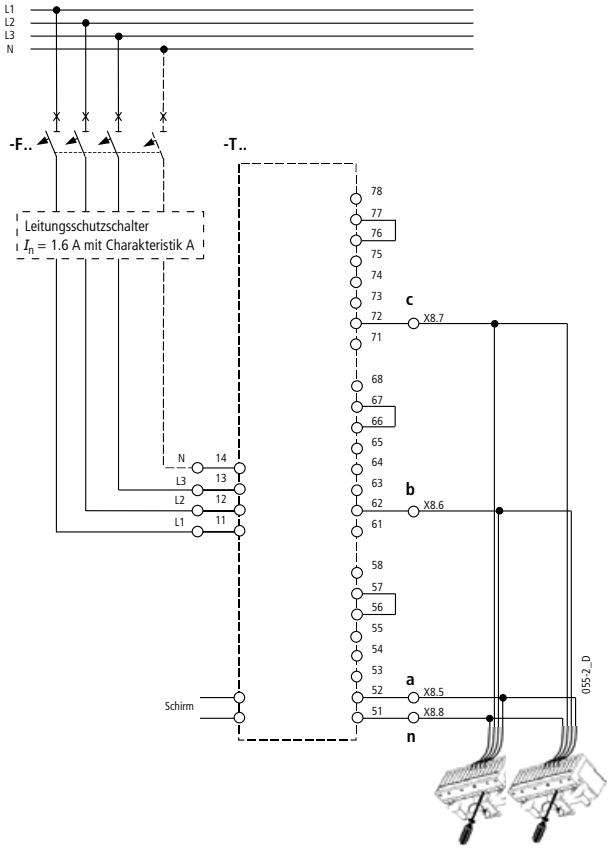


X8.5: Phase L1/a
X8.6: Phase L2/b
X8.7: Phase L3/c
X8.8: N/n

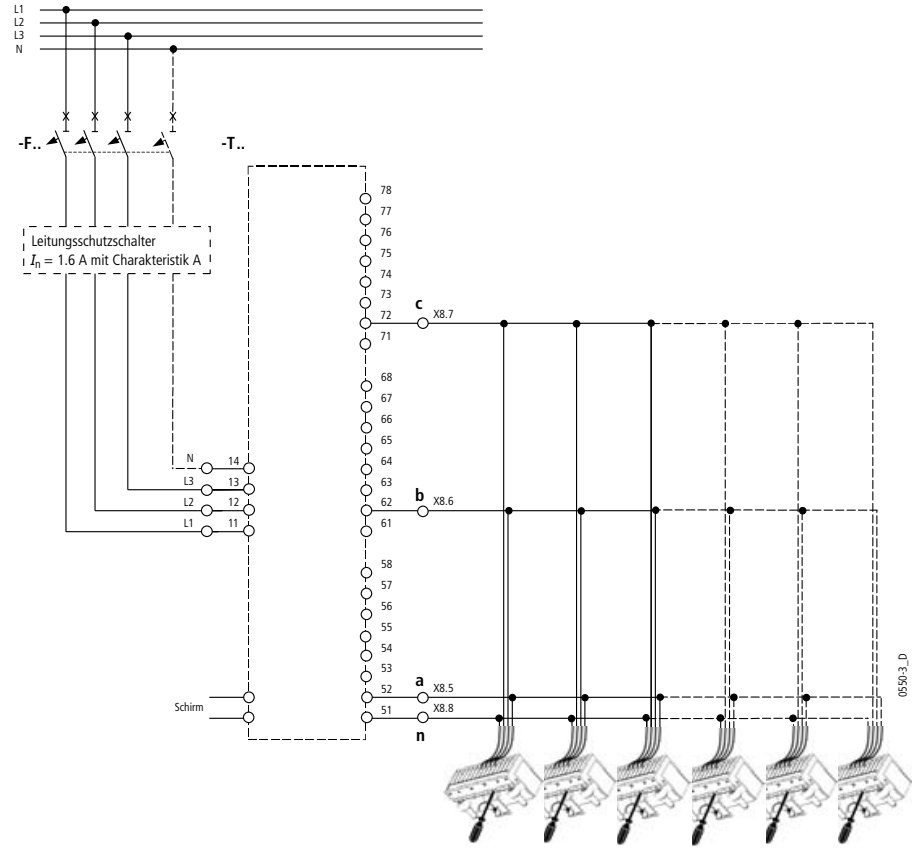
Connection examples



1 × measuring function: primary (L-L) 380 V … 690 V AC
secondary connection one measuring function



2 × measuring functions: primary (L-L) 380 V … 690 V AC
secondary connection two measuring functions



3 – 6 × measuring functions: primary (L-L) 380 V … 690 V AC
secondary connection from three to six measuring functions

Parameterizing the metering function

The measuring functions must be subsequently parameterised via the overcurrent release on the voltage transformer input voltage 400V with primary star-switching.

The parameterisation can be via :

– the graphic display (digital release IZM..D)
– The test socket with the parameter assignment module XEM-PG(E)
– The PROFIBUS-DP with a PC and the system-software

Via CHANGE PARAMETER / System Config. / voltage CT the following data of the voltage CT must be entered:

– Primary 400 V (default setting)
– Secondary 100 V (default setting)
– Star switching (default setting)

Via CHANGE PARAMETER / System Config. / power flow must be entered:

– Top to bottom (default setting)

or

– bottom to top

Via CHANGE PARAMETER / System Config. / phase rotation must be entered:

– L1 - L2 - L3 (default setting)

or

– L1 - L3 - L2

Customer orders for voltage transformers

Ordering by customers is possible when the following conditions apply:

– Rated output voltage 100 V…120 V
– Output load with 100 k for each connected measuring function
– For a measuring accuracy of 1% class 0.5 transformers are necessary

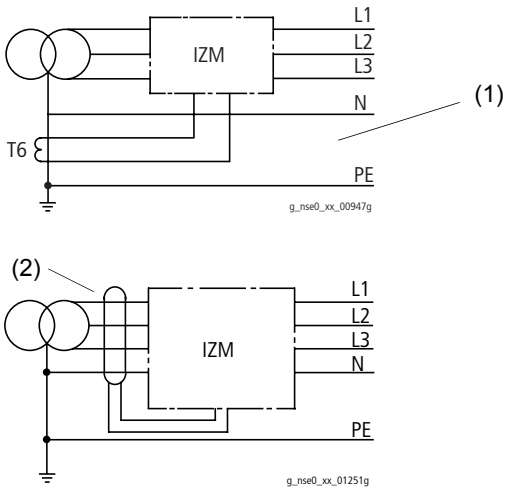
The voltage transformers have to be wired according to circuit examples (→ page 9 – 71) and protected both on the primary and the secondary side.

9.3.4 External summation transformer

To guarantee the protection function from impermissable earth-fault currents a standard external voltage transformer with the following characteristics can be used:

– Primary rated current: 1200A
– Secondary rated current: 1A
– Accuracy: class 1
– Internal switching load: 0.11 Ohm

Example

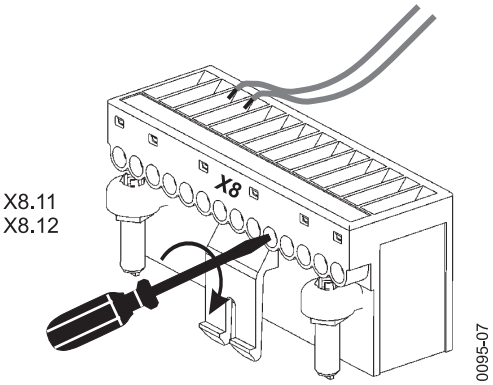


(1) 3 pole circuit-breaker with current transformer in the earthed star-point of the transformer.
(2) 4 pole circuit-breaker with core-balance current transformer

Connection

Note

It may be necessary to retrofit missing control-circuit connections (knife contact rail, auxiliary plugs, sliding contacts for connection area).
→ (page 5 – 16)



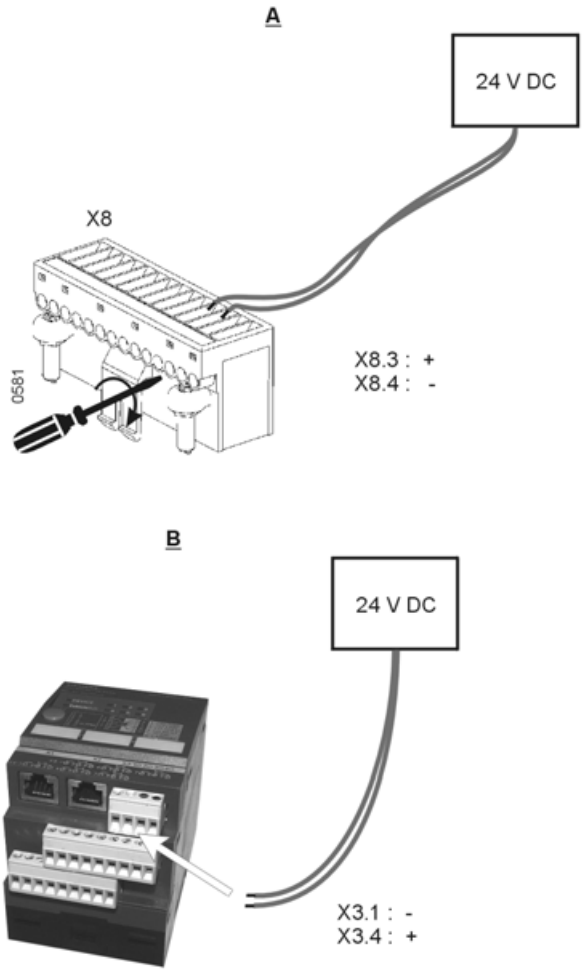
9.4 External supply voltage

The basic functions of the electronic overcurrent releases do not require auxiliary power supply.

Should further functions of the overcurrent releases XZMU and XZMD be used that require a data exchange over the internal system bus, an external 24 V DC power supply must be connected.

Connection

Version **A**: connection to the plug X8 (prefered version)
Version **B**: connection to any expansion module



Requirements

The external voltage supply with 24 V DC must comply at least with the requirements of EN 61204.

To supply a circuit-breaker equiped with the maximum number of external expansion modules the power supply shown below can be used.

When using voltage supply units from other manufacturers, the following conditions must be fulfilled:

– Primary-switched-mode power supply unit

– 24 V DC, ±3 %

– Current rating: 5 A per circuit-breaker with the maximum number of external expansion modules possible

Article number

	Part no.
Power supply input: AC 110/240 V, output 24 V DC/5 A	SN3-050-BU8

CAUTION

The external power supply, used for electronic components, shall not be used to supply the motor operating mechanism!

	Max. continuous current mA	**Max. starting current mA**
Current consumption for the communication module		
Release XZMU	120	2000
Release XZMD	170	2000
Measuring function XMP or XMH	120	120
Breaker Status Sensor XBSS	40	110
Communication module XCOM-DP	125	280
ZSI-module	50	125
Digital output module with rotary coding switch, relay outputs	180	125
Digital output module, configurable, relay outputs	180	125
Analog output module	110	800
Digital input module	30	125
Parameterising device PG (E)	250	350

9.5 Parameter assignment module

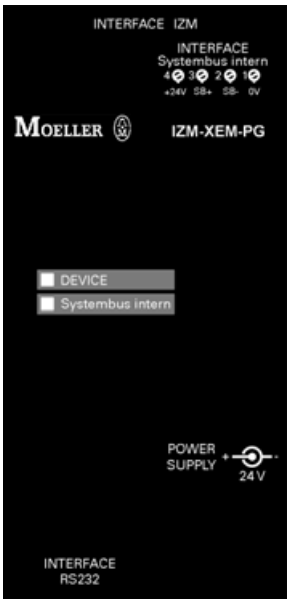
9.5.1 Application

The Parameter assignment module PG(E) makes it possible to parameterise, operate and observe the circuit-breaker without additional software by means of an input/output unit with browser features (e.g. a notebook). The only system requirement is a standard Browser with JAVA 2 Virtual Machine. After the connection of the parameter assignment module to the circuit-breaker the browser is loaded with the website of the parameter assignment module and the circuit-breaker. This is possible for circuit-breakers equipped with overcurrent releases of the part nos XZMU and XZMD. On the overcurrent release XZMU, however, the basic protective functions cannot be parameterisd. These are adjusted with the rotary coding switches.

Communications with the electronic system of the circuit-breaker takes place through the internal system bus. For this purpose, the PG(E) can be optionally connected to the test socket of the overcurrent release, or – in case of longer stationary operation – to the last expansion module, and snapped on a 35-mm DIN-rail. The required connection cables are supplied with the unit.

Two PG(E) versions are available. Differently to the standard version the PGE contains additionally an Ethernet connection.

9.5.2 Design



9.5.3 Indications

LED	Indicator	Significance
DEVICE	Green	PG(E) in operation
	Yellow	PG(E) in test mode
	Red	PG(E) faulty
Internal system bus	Green	Connection to internal system bus available
	Red	Serious fault on the internal system bus; check connections and expansion modules
	Off	No connection to internal system bus

9.5.4 Connection versions

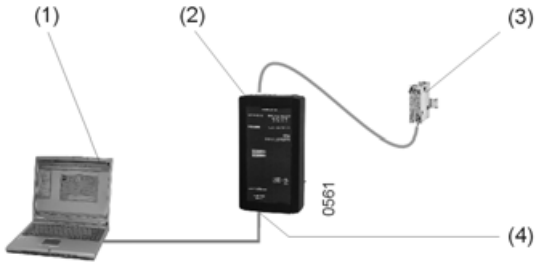
The PG(E) is connected in different ways according to the corresponding application.

Note

To avoid malfunctions, connect the voltage supply at last.

Offline mode

All circuit-breaker parameters can be entered and saved e.g. on a notebook, without the need to communicate with the circuit-breaker. When the connection to the circuit-breaker is established, this data can be transmitted and the circuit-breaker can be parameterized automatically.

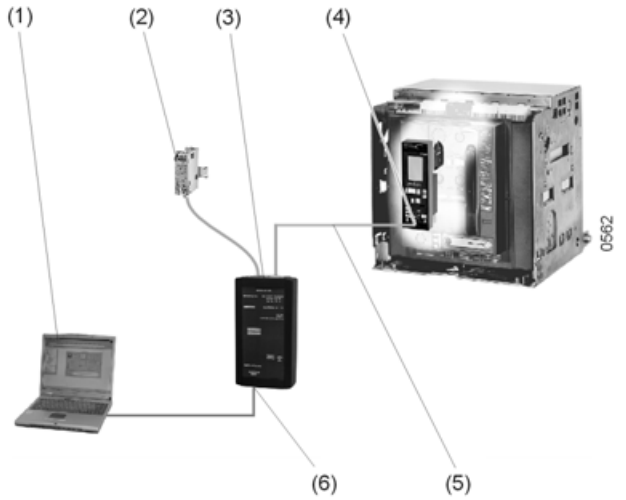


(1) Input/output unit with browser feature (e.g. notebook)
(2) PG or PGE
(3) Voltage supply 24 V DC
(4) RS232 interface

The power supply can be from a standard 24 V DC plug-in power supply with 5.5 mm jackplug (“Plus” pole in centre) and 500 mA rated load. The plug-in power supply must conform with SELV specifications.

Local operation

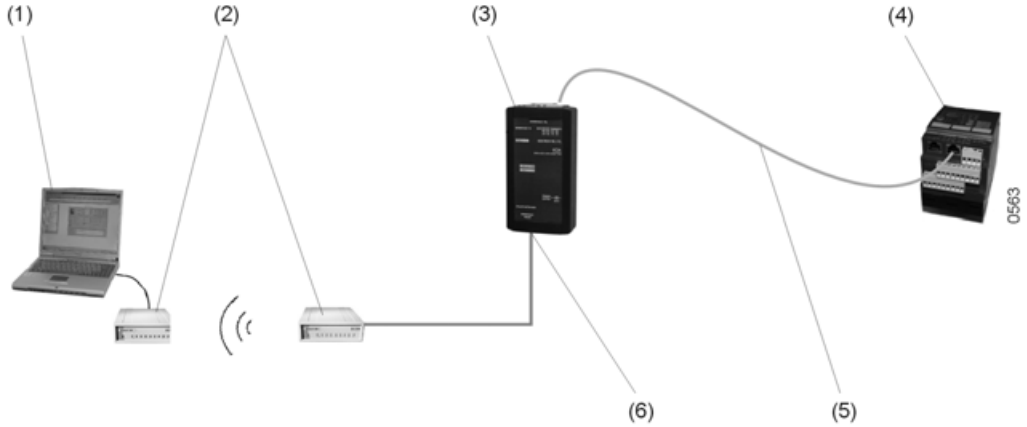
The circuit-breaker is parameterised directly on site. Furthermore, the parameter settings can be saved on the notebook, and the circuit-breaker diagnosis data can be read.



(1) Input/output unit with browser feature (e.g. notebook)
(2) Voltage supply 24 V DC, if there is no voltage supply via the internal system bus
(3) PG or PGE
(4) Test socket of the overcurrent release (40-pole)
(5) – Connection cable SUB-D, 15-pole (PG(E)) to SUB-D, 40-pole (test socket of overcurrent release) or
– connection cable from overcurrent release Ser. No. 02 SUB-D 15 pole (PG(E)) on plug connector 40 pole
(6) RS232 interface SUB-D, 9-pole

Remote access via modem

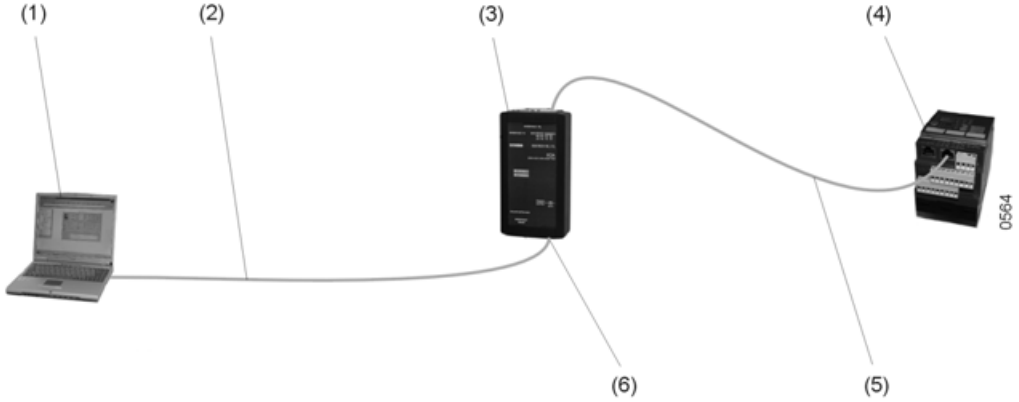
The circuit-breaker data including parameterisation can be accessed from any remote location.



(1) Input/output unit with browser feature (e.g. notebook)
(2) Modem
(3) PG or PGE
(4) External expansion module
(5) Connection cable SUB-D, 15-pole (PG(E)) to RJ45 western plug (connection internal system bus)
(6) RS232 interface SUB-D, 9-pole

Remote access via Ethernet

The circuit-breaker data including parameterization is accessed via the customer-side Ethernet. This connection is only possible with the parameter assignment module PGE.



(1) Input/output unit with browser feature (e.g. notebook)
(2) Ethernet cable
(3) PGE
(4) External expansion module
(5) Connection cable SUB-D, 15-pole (PG(E)) to RJ45 western plug (connection internal system bus)
(6) Ethernet connection

9.5.5 Power supply

The PG(E) requires a voltage supply of 24 V DC. This can be applied through:

– A separate normal plug-in power supply unit (→ page 9 – 74) or
– the internal system bus with the external voltage supply of the circuit-breaker electronics

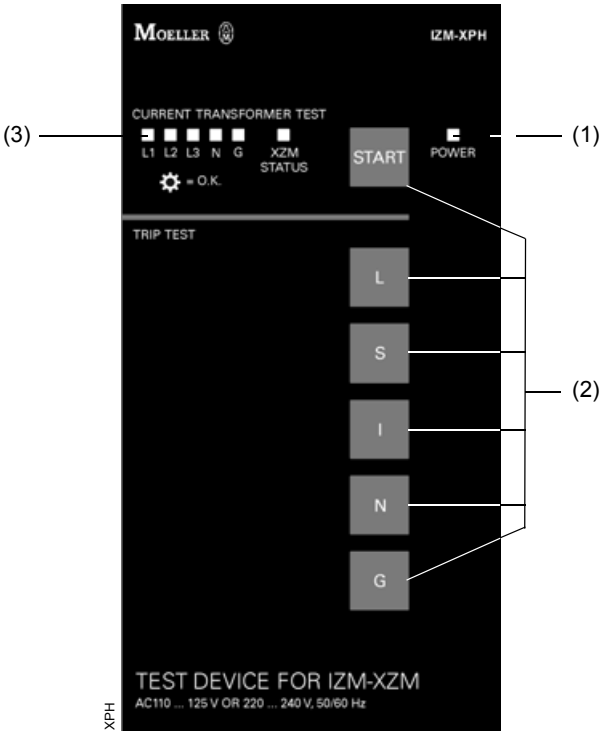
9.5.6 Article numbers

	Part no.
Parameter assignment module	IZM-XEM-PG
Parameter assignment module with Ethernet interface	IZM-XEM-PGE

9.6 Hand-held test unit IZM-XPH for electronic overcurrent release

The hand-held test unit can be used to check the correct functioning of the overcurrent release, the power and current transformers, the release coil F5 and the measured value indicator.

9.6.1 Design



(1) LED for operating voltage indication
(2) Control buttons
(3) 6 LEDs to show test results

9.6.2 Preparations

– Switch off and isolate the circuit-breaker
– Note the setting values of the overload release
– Earth-fault protection, trips when present using the overcurrent release (I_g = OFF)
– Setting $I_{r = 1.0\ In}$
– Interrupt external voltage supply for the electronic system if present (connections X8: 3,4)
– Remove cover from the test socket X25 of the XZM.

	CAUTION
⚠	The hand-held test unit is designed for testing an overcurrent release in an inactive state on the IZM circuit-breaker. An overcurrent release cannot be tested without circuit-breaker/transformer/coil. An overcurrent release activated by a current flow in the circuit-breaker or the internal system bus will also lead to incorrect results and in the worst case to destruction of the test device.

Note

When no N CT is connected to auxiliary plug X8: 9/10 the terminals 9/10 must be bridged!
(→ page 8 – 1)

9.6.3 Environmental conditions according to DIN-EN 61010-01 and IEC 61010-01

Qualified Person

For the purpose of this operating manual, a „qualified person“ is one who is familiar with the installation, construction and operation of the equipment and the hazards involved.
In addition, he has the following qualifications:

– Is trained and authorized to energize, de-energize, clear, earth and tag circuits and equipment in accordance with established safety practices.
– Is trained in the proper care and use of protective equipment in accordance with established safety practices.
– Is trained in rendering first aid.

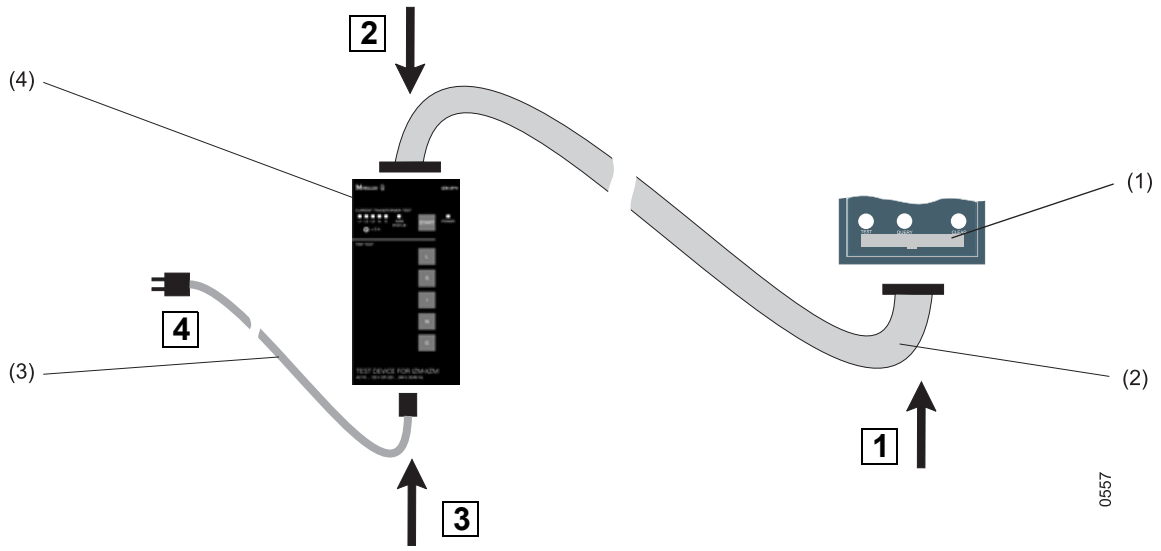
The hend-held test unit is suited for operation in enclosed spaces.

The following conditions must be observed:

– Environmental conditions in accordance to DIN EN 61010-01 1.4.1 and IEC 61010-01 1.4.1
– Variation of mains voltage ≤ 10%
– Impulse-withstand-voltage corresponding to overvoltage-category II (EC 60364-4-44)
– Pollution degree 2
– Clean with a damp, soft cloth only, no solvents, no detergents

9.6.4 Connection

ATTENTION
Please observe the connecting sequence! Otherwise there may be false tripping and false test results. Check connectors for proper assembly.



(1) Test socket at the overcurrent release
(2) – SUB-D 40-pole (hand held test unit) to socket connector, 40-pole
or
– from overcurrent release Ser. No. 02, SUB-D, 40 pole (hand held test unit) on plug connector 40 pole
(3) Voltage supply
(4) Hand-held test unit

9.6.5 Power supply

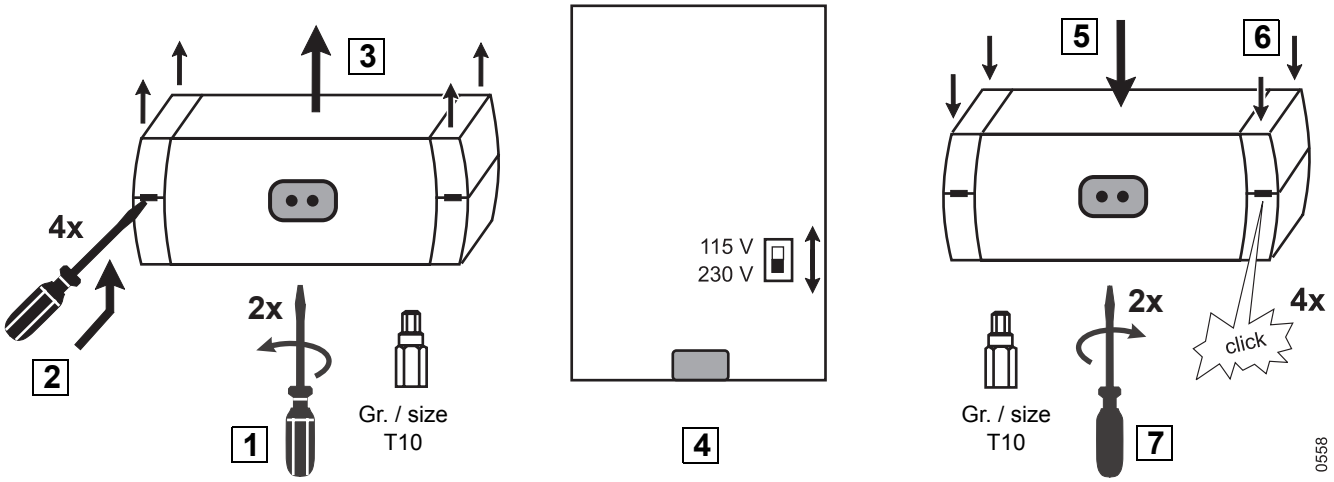
The hand-held test unit can be supplied by an AC power supply 220 – 240 V or 110 – 125 V, 50/60 Hz. Ex-factory setting is 220 – 240 V. The changeover switch is located on the printed circuit board inside the test device.

Provided fuse: 250 mA slow/250 V
This fuse should be used at both primary- voltages.

	Note
	After mains voltage reconnection update the labels, using a white and indelible ink pen!

9.6.6 Mains voltage reconnection

	Danger
	**Dangerous electrical voltage!** **Can cause death or serious personal injury as well as damage to device and equipment.** Disconnect power before opening this device. Therefor disconnect feeder!



9.6.7 Operation

The status test starts immediately after connecting the voltage supply, inquiring various components and parameters of the overcurrent release. When the status test is successful “XZM STATUS” LED shows continuously. Otherwise the overload release or one of it´s components (e.g. rating plug) is faulty or missing. Then the “XZM” LED flashes. From the type of flashing the cause of the fault can be seen.

Indicator	Significance
1 x short, pause	Test device faulty
2 x short, pause	Overload release faulty
3 x short, pause	Type of overload release not identified
4 x short, pause	– Parameter not correctly set – Current transformer not correctly connected – Incorrect rating plug – Rating plug missing
5 x short, pause	– Release coil F5 not correctly connected or faulty

The status test can be repeated at any time by pressing the “START” button for more than 3 seconds. It is also possible to test already activated overcurrent releases, e.g. one that is powered from an external power supply. It should be noted that it is possible that the "XZM STATUS" could flash twice without there being a fault. As double check the status check should be redone with the overcurrent release´s external power supply switched off.

Note

The status check cannot be carried out with an overcurrent release of type XZMV/XZMV+XT/XZMA with an identity number lower as 253030xxxxxx / 273030xxxxxx / 150704xxxxxx.

The status check for this type can be jumped over by pressing the “L” button for approx. 3 seconds when the power supply is connected to the test device. In this case the correct functioning of the overcurrent release must be checked before starting further checks with the test device, e.g. by the function “activation of the overcurrent release” and checking the LED indication on the overcurrent release.

Testing the transformer

To check the current and power transformer press quickly (less than 2 s.) the “START” button.

START

A LED confirms the correct function of the respective transformer. If an LED flashes, the corresponding transformer is not available, not properly connected or defective.

Energy-transformers within CT’s will be tested "OK", if within the limits of 3,5 - 12 ohms and with an inductance above 300 mH. External earth-fault-CT’s within the limits of 2,5 - 11 ohms and inductance above 500 mH will be tested similarly.

The lenght of the testing-period necessary may reach 65 sec.

Result of N CT test
(with overcurrent release Ser. No. 02)

One flash (1s on, 1s off) signals a fault in the N measuring CT area. The cause is either a faulty measuring CT (e.g. external N conductor - CT connected) a faulty connection or a defect measuring CT.

A fast flash (0.5 s on, 0.5 s off) signals a fault in the N power CT area. Cause is either a faulty CT (e.g. by connection of an external CT), a faulty connection to power CT or a defect power CT.

Testing the tripping function

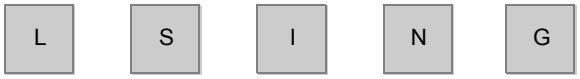
Note

Overcurrent release of the type XZMV or XZMV+XT with an identity number lower than 250205xxxxxx or 270206xxxxxx react only to the checking of the L tripping.

– Charge the storage spring by hand
– Switch on

To test the tripping function, press one of the buttons “L”, “S”, “I”, “N” or “G”.

The test of tripping function will fail, if the coreesponding protective funtions of the overcurrent release is not activated or available.



The circuit-breaker trips after the set time delay plus 2 seconds. The tripping reason can be inquired through the “PROTOCOL” button at the overcurrent release. The trip cause storage function is available only, if the overcurrent release had been activated for least 10 min before tripping. Otherwise, the overcurrent release doesn't have the corresponding protective function or is defective.

Testing the measured value indication

After a tripping test is carried out the function of the memory capability should be checked for non-activated overcurrent releases using the "PROTOCOL" button.

Press the “I” and “N” buttons at the same time to check the measure value indication in the display or by remote transmission.

For 30 s a current will be simulated in L1, L2, L3, N and G via the measuring CT. The LED of the appropriate CT will flash. The test is successful when current is shown on the appropriate position.

Activating the overload releases

To activate the overcurrent releases press the “N” and “G” buttons at the same time.

Until another button is pressed the overcurrent release stays activated.

With this function, for example, the “Error” LED can be checked when the status test with the error “overcurrent release faulty” is finished.

9.6.8 Follow-up work

– Reset noted set values
– Replace X25 cover (test socket overcurrent release)

9.6.9 Article numbers

	Type (Article no.)
Hand-held test unit	IZM-XPH (226018)

10 Reclosing lockout and remote reset

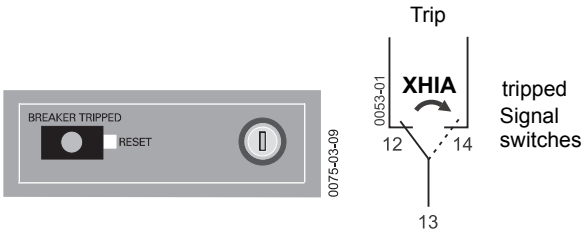
Automatic reset and remote reset	Part no.
Automatic reset of the mechanic reclosing lockout	+IZM-XOW
Remote reset	+IZM-XFR24DC
(includes IZM-XOW function)	+IZM-XFR48DC
1. Automatic reset of the mechanical reclosing lockout	+IZM-XFR120AC/125DC
2. Rest of the tripping indication (red pin and IZM-XHIA reset)	+IZM-XFR230AC/250DC

10.1 Manual reset of the reclosing lockout

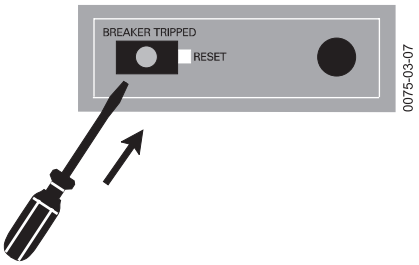
1 Circuit-breaker is tripped by overcurrent

2 Indications

Signals

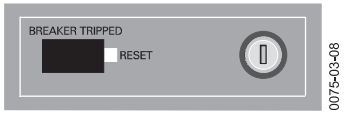


3 **Manual reset**

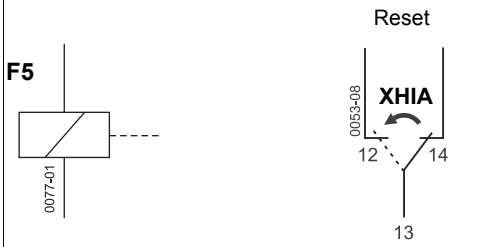


Press tripped indicator (red pin), till it latches

4



Tripped indicator reset



Tripping magnet

Trip signalling switch

Tripping magnet and tripped signal are reset.

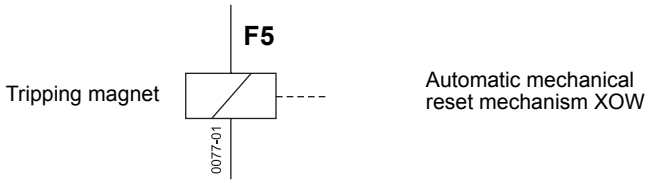
5 Indications

Circuit-breaker is ready to close again, if spring is charged and no interlock is active

10.2 Automatic reset of reclosing lockout

1 Circuit-breaker is **tripped** by overcurrent

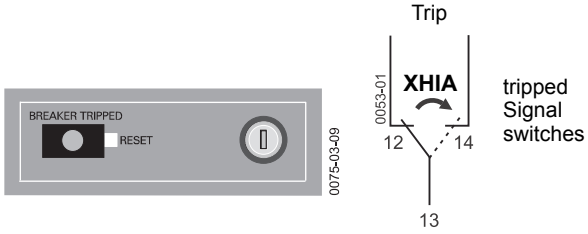
2 **Automatic reset**



3 Indications

Circuit-breaker is **immediately** ready to close again, if storage spring is charged

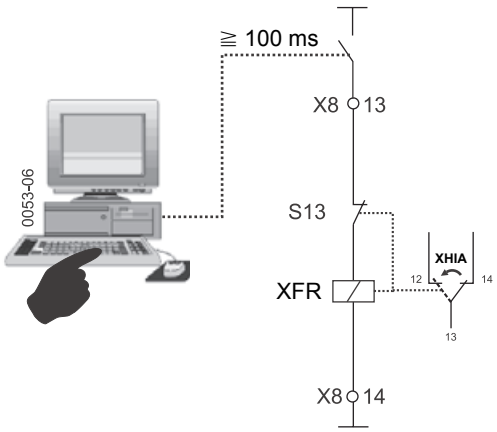
Signals



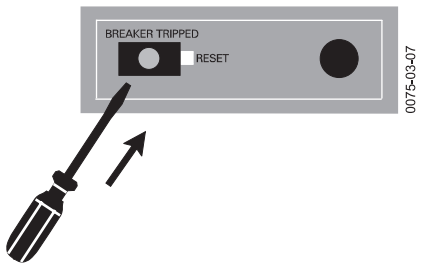
4 **Reset tripped indicator and tripped signal**

Remote reset

Option: Remote reset of the tripped indicator and the tripped signal by means of a remote reset coil(→ page 10 – 3)

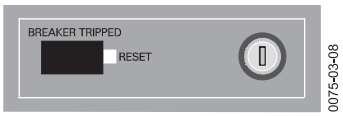


Manual reset

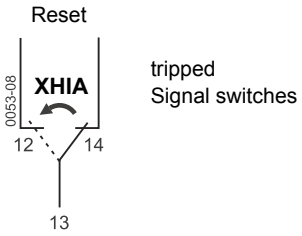


Press tripped indicator (red pin), till it latches

5



Tripped indicator reset



Tripped signal reset

10.3 Retrofitting automatic reset

With the automatic reset of the reclosing lockout the tripping magnet is automatically reset after the overcurrent release has tripped. The circuit-breaker is immediately ready to close again. The tripped indication and the tripped signal must be reset either manually on the overcurrent release or by means of the remote reset magnet.

	WARNING
	**Danger of injury!** The switching mechanism could cause personal injury when the operating panel is removed. Before removing the operating panel switch off power and discharge the spring (→ page 24 – 2). – Remove the plug X5 – Press OFF button – Press ON button – Press OFF button once again.

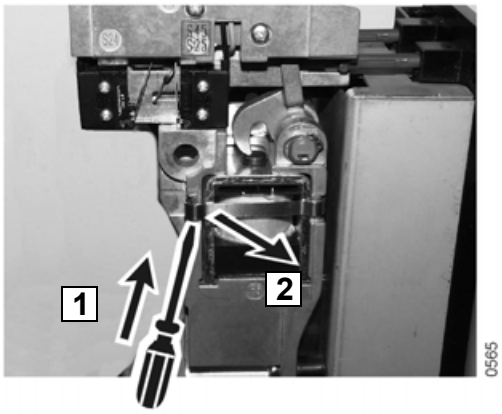
– Remove front panel (→ page 24 – 6)

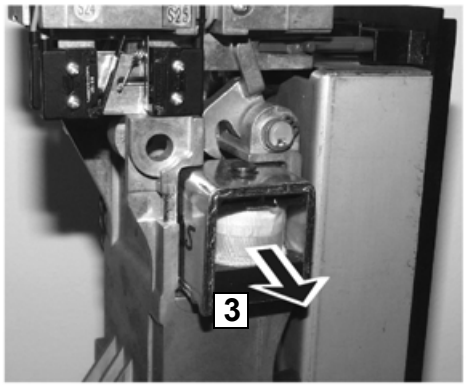
– Remove overcurrent release (→ page 9 – 39)

10.3.1 Installing reset mechanism

Removing tripping magnet F5

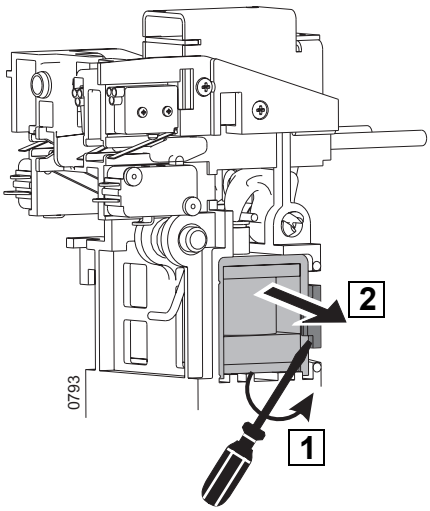
Metal bracket for overcurrent release (silver):





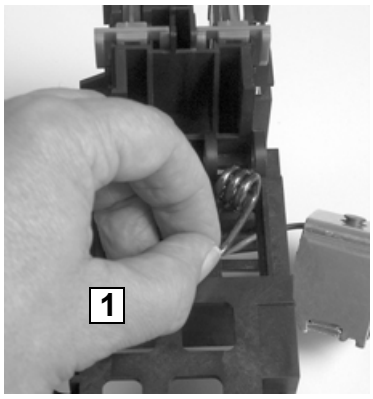
1 Loosen retaining spring
2 Remove retaining spring
3 Remove tripping magnet

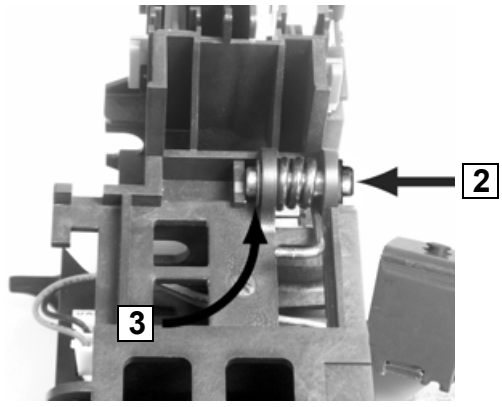
Plastic bracket for overcurrent release (black):



1 Press back catch
2 Remove tripping magnet

Installing reset spring and bolt



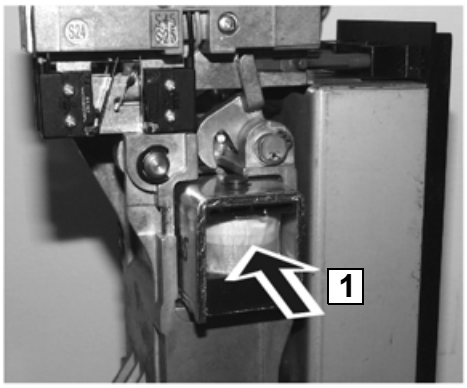


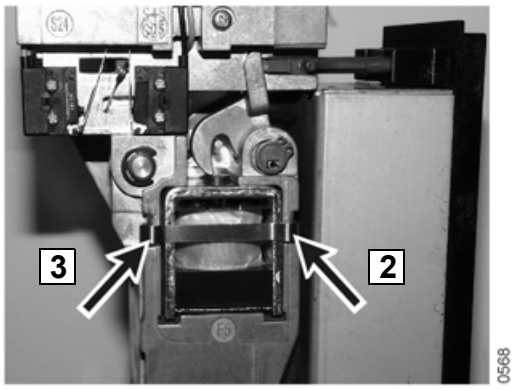
1 Fit reset spring
2 Fit bolt with lock washer
3 Secure bolt with lock washer on the left

Installing tripping magnet F5

CAUTION
Do not squeeze the connecting cables of the tripping magnet during installation!

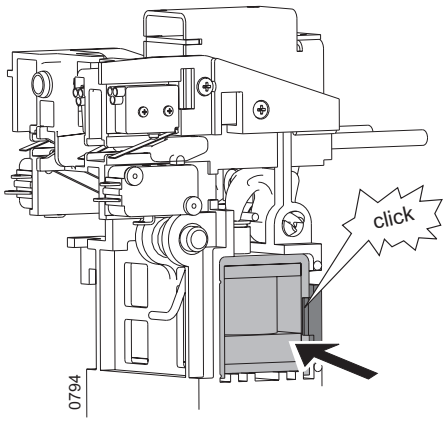
Metal bracket for overcurrent release (silver):





1 Fix tripping magnet
2 Fix retaining spring, on the right
3 Snap retaining spring on, on the left

Plastic bracket for overcurrent release (black):



Then:

– Install overcurrent release (→ page 9 – 39)
– Install front panel (→ page 24 – 13)

CAUTION
Minimum pause = 80 ms between tripping by overcurrent release and the next switch-on of the circuit-breaker.

	Part no.
Automatic reset of the reclosing lockout for overcurrent release bracket in metal (until 07/2005)	IZM-XOW-M
Automatic reset of the reclosing lockout for overcurrent release bracket in plastic	IZM-XOW

10.4 Retrofitting the remote reset option

Firstly retrofit the automatic reset of the reclosing lockout(→ page 10 – 3).

CAUTION
Remote reset magnet usable only with automatic reset reclosing lockout! Otherwise remote reset magnet will be overloaded and destroyed.

10.4.1 Fitting

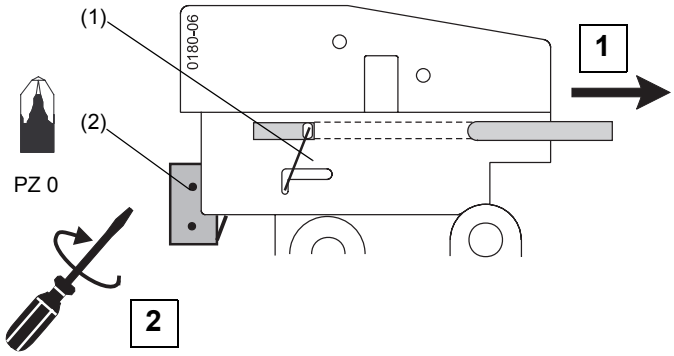
	WARNING
	**Danger of injury!** The switching mechanism could cause personal injury when the operating panel is removed. Before removing the operating panel switch off power and discharge the spring (→ page 24 – 2). – Remove the plug X5 – Press OFF button – Press ON button – Press OFF button once again.

– Remove front panel (→ page 24 – 6)
– Remove overcurrent release (→ page 9 – 39)

Mounting the cut-off switch S13 for remote reset coil

Metal bracket for overcurrent release (silver):

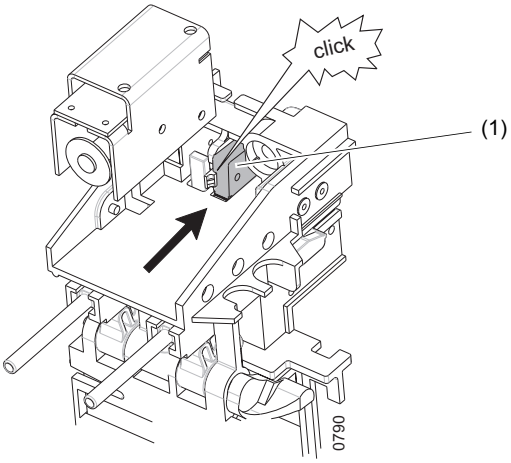
CAUTION
Tighten self-tapping screws carefully. The signalling switches must not be deformed during installation.



(1) Leg spring
Not necessary for overcurrent release bracket in plastic (black).

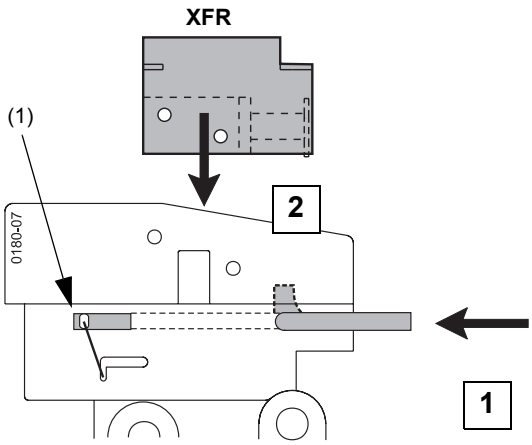
(2) S13 rear

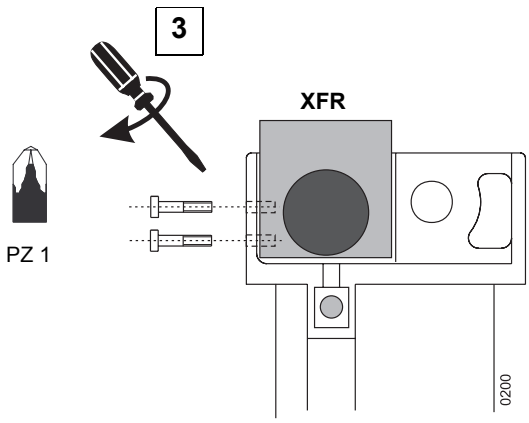
Plastic bracket for overcurrent release (black):



(1) cut-off switch S13

Mounting remote reset magnet





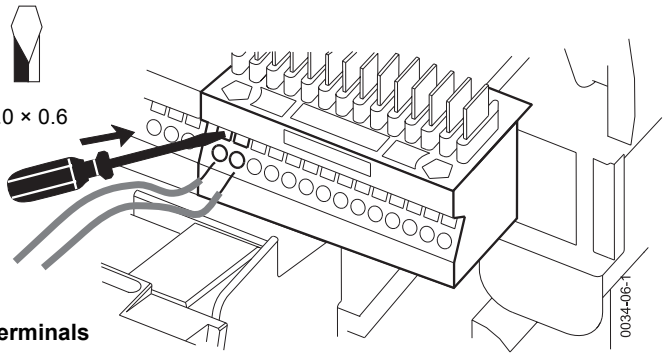
(1) Leg spring
Not necessary for overcurrent release bracket in plastic (black).

10.4.2 Connecting wires

→ Circuit diagrams (page 8 – 1)

Note

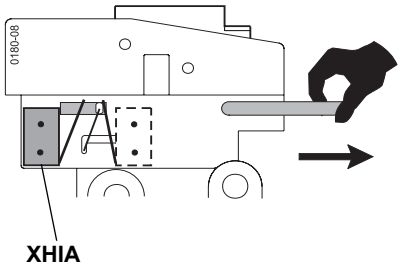
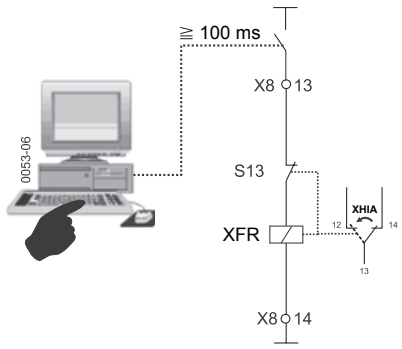
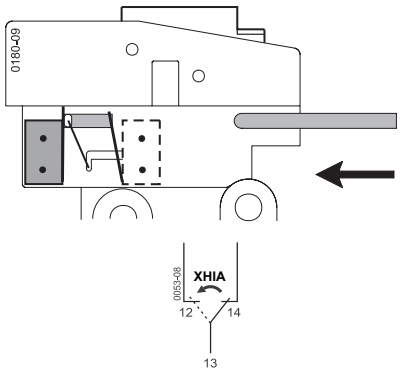
(→ page 5 – 16 ff) It may be necessary to retrofit missing control-circuit connections (knife contact rail, auxiliary plugs, sliding contacts for connection area).



Terminals

XB.13
XB.14

10.4.3 Function test

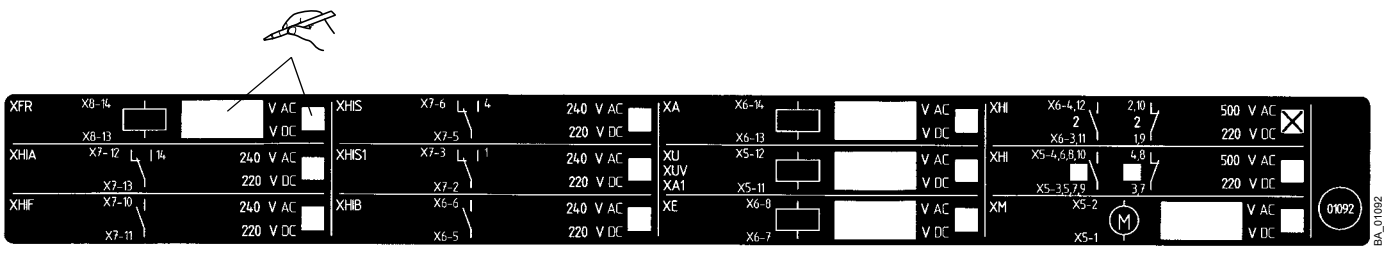
1	2	3
		

Then:

– Install overcurrent release (→ page 9 – 39)
– Install front panel (→ page 24 – 13)

10.4.4 Updating the options label

Use an indelible ink pen!



11 Control switch

WARNING

Can cause death or personal injury.

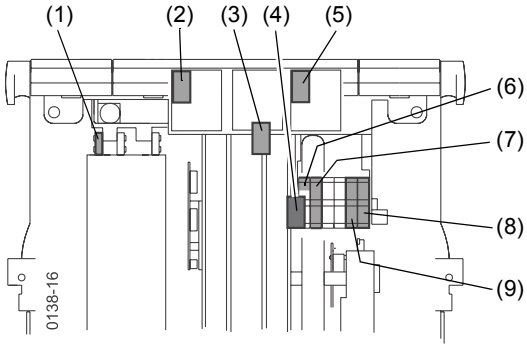
Before removing any covers and the operating panel of the circuit-breaker be sure to discharge the storage spring. (→ page 24 – 2)

Auxiliary and control switches	Part no.
Standard auxiliary switch 2 N/O, 2 N/C	XHI
Additional auxiliary switch	(+)IZM-XHI20
	(+)IZM-XHI11
	(+)IZM-XHI31
	(+)IZM-XHI40
Tripped signalling switch for overcurrent release bracket in metal (until 07/2005)	IZM-XHIA-M
Tripped signalling switch for overcurrent release bracket in plastic	(+)IZM-XHIA
Signal for voltage release state on shunt release	(+)IZM-XHIS
Signal for voltage release state on 2nd shunt release or undervoltage release	+IZM-XHIS1
Signalling switch for ready-to-close	(+)IZM-XHIB
Signalling switch for storage spring charged	(+)IZM-XHIF

Note

Screw terminals are standard on the customer side, spring terminals are optional.
The XHIA, XHIS(1) auxiliary switches cannot be combined with (+)IZM-XCOM-DP or (+)IZM-XBSS.
The XHIF auxiliary switch cannot be combined with (+)IZM-XCOM-DP.
XHIS and XHIS1 are identical. The different part nos define the installation location with complete delivery ex-works (comparable with XA and XA1).

11.1 Signalling switches

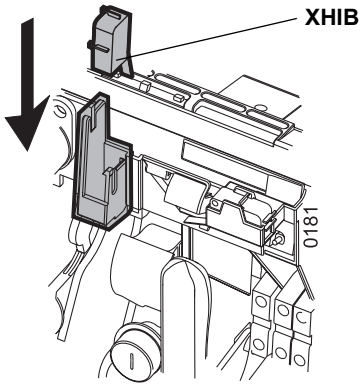


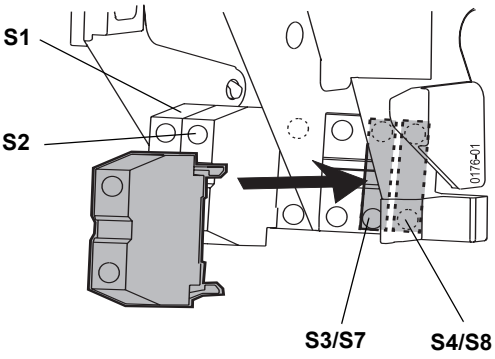
(1) Tripped signalling switch XHIA
(2) Signalling switch XHIS for 1st shunt release (→ page 13 – 3)
(3) Signalling switch for ready-to-close XHIB
(4) Signalling switch for spring state XHIF
(5) Signalling switch XHIS1 for 2nd shunt release or undervoltage release (→ page 13 – 3)
(6) Contact position auxiliary switch S1 (standard)
(7) Contact position-driven auxiliary switch S2 (standard)
(8) Contact position-driven auxiliary switch S4 (XHI22) or S8 (XHI40)
(9) Contact position-driven auxiliary switch S3 (XHI11(22)(31) or S7 (XHI40)

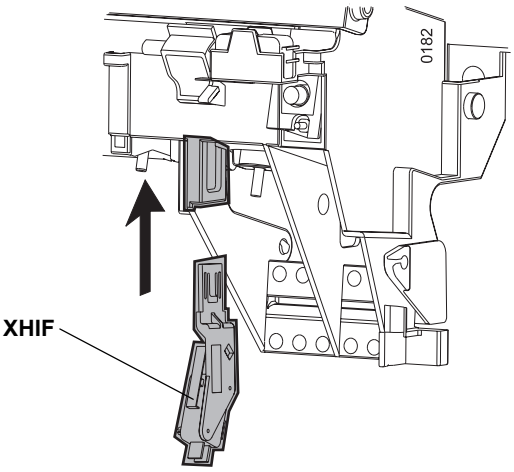
11.1.1 Mounting signalling switches

	WARNING
	**Danger of injury!** The switching mechanism could cause personal injury when the operating panel is removed. Before removing the operating panel switch off power and discharge the spring (→ page 24 – 2). – Remove the plug X5 – Press OFF button – Press ON button – Press OFF button once again.

– Remove front panel (→ page 24 – 6)





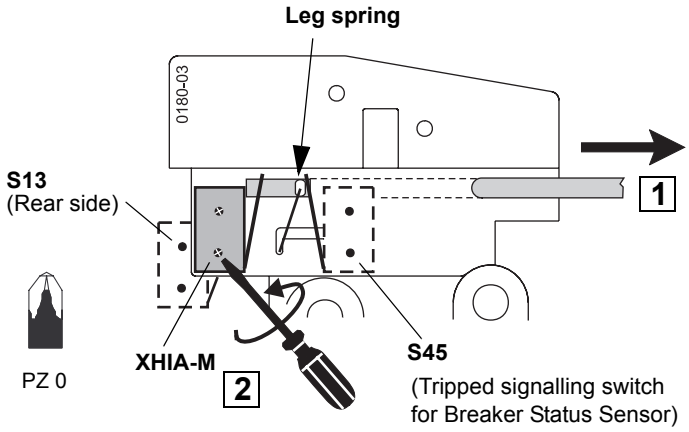


11.1.2 Mounting signalling switches at trip unit

– Remove overcurrent release (→ page 9 – 39)

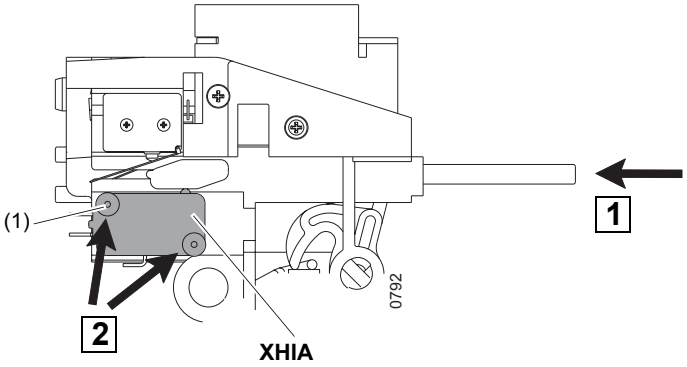
Metal bracket for overcurrent release (silver):

CAUTION
Tighten self-tapping screws carefully. The signalling switches must not be deformed during installation.



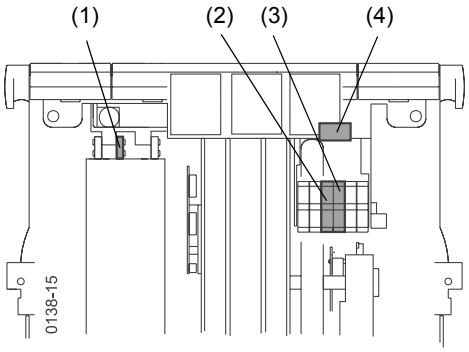
Necessary for IZM circuit-breackers with metal system carrier (07/2005)

Plastic bracket for overcurrent release (black):



(1) 2 snap pins

11.2 Control switches



(1) Cut-off switch S13 for remote reset (→ page 10 – 4)
(2) Cut-off switch S14 for shunt release XA...05 (overexcited) (→ page 13 – 4)
(3) Cut-off switch S15 for closing release XE...05 (overexcited) (→ page 13 – 4)
(4) Switch XEE “Electrical ON” or (→ page 13 – 5) motor disconnecting switch XMS (→ page 12 – 3)

11.3 Communication switches

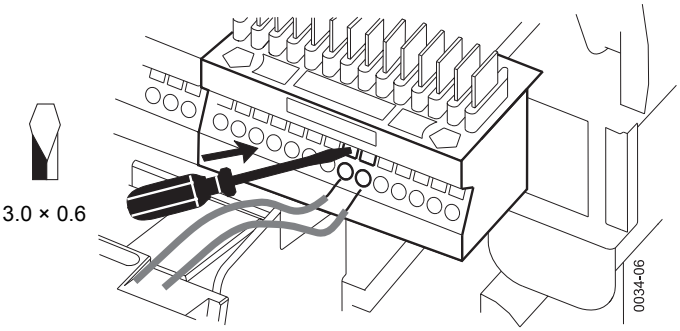
→ Status signals for the communication (page 9 – 47)

11.4 Connecting wires

Circuit diagrams (→ page 8 – 2)

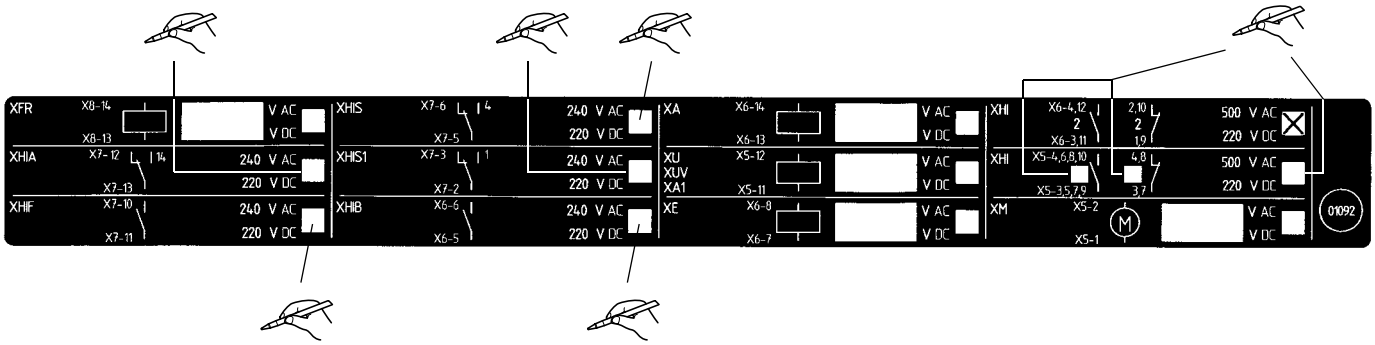
Note

It may be necessary to retrofit missing control-circuit connections (knife contact rail, auxiliary plugs, sliding contacts for connection area).
(→ page 5 – 16 ff)



Updating the options label

Use an indelible ink pen



12 Motor operator

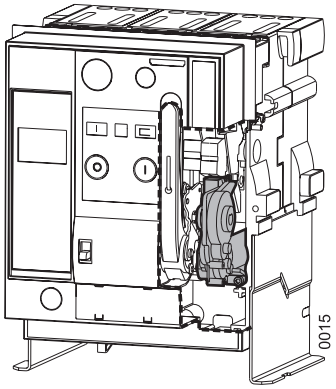
For automatic charging of the spring after every switch ON. Will be switched on if spring is discharged and control voltage is applied. Is automatically de-energized after charging.

	Voltage	Power consumption	Part no.
Motor operator	24 – 30 V DC	110 W	(+)IZM-XM24-DC
	48-60 V DC	120 W	(+)IZM-XM48-60DC
	110 – 127 V AC/110 – 125 V DC	150 W	(+)IZM-XM110AC/DC
	208 – 240 V AC/220 – 250 V DC	130 W	(+)IZM-XM230AC/220DC
Motor cut-off switch			(+)IZM-XMS
Make-break operations counter			(+)IZM-XSZ

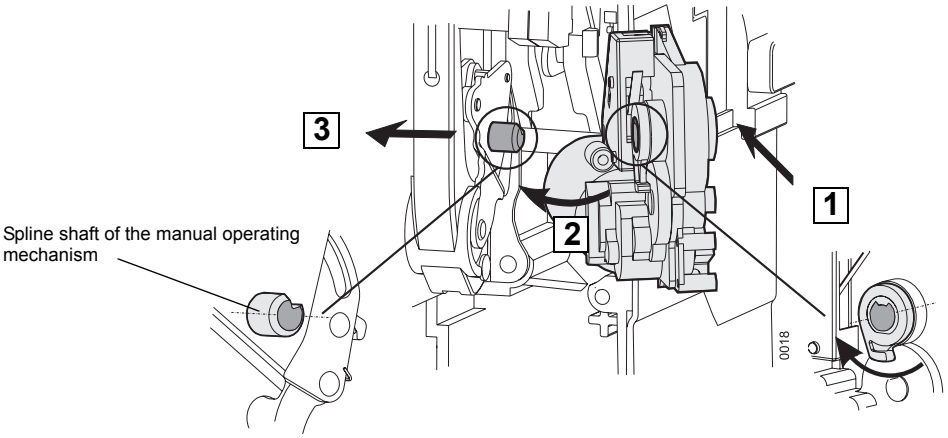
12.1 Retrofitting the motor operator

	WARNING
	**Danger of injury!** The switching mechanism could cause personal injury when the operating panel is removed. Before removing the operating panel switch off power and discharge the spring (→ page 24 – 2). – Remove the plug X5 – Press OFF button – Press ON button – Press OFF button once again.

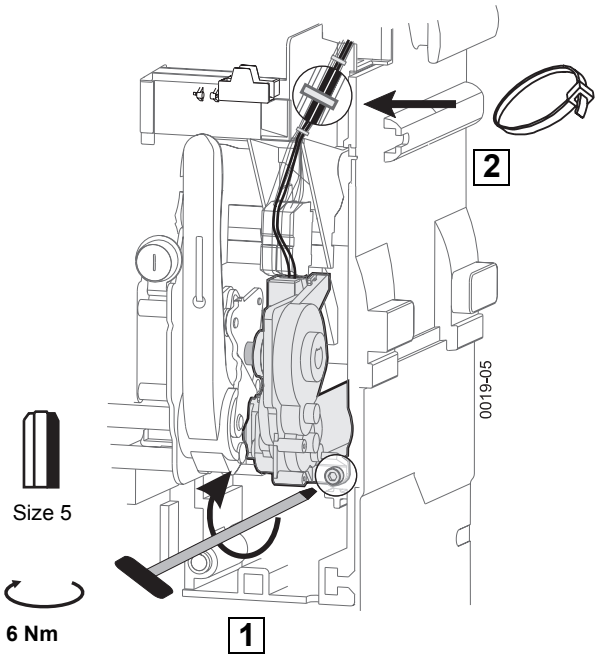
– Remove front panel (→ page 24 – 6)

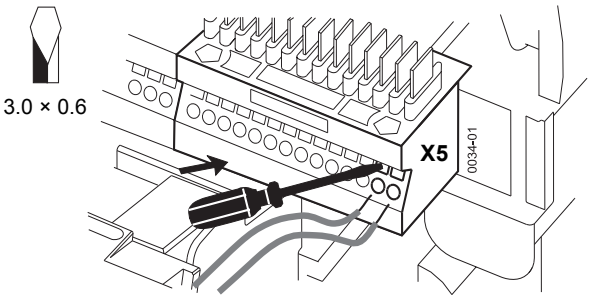


Mounting the motor on the spline shaft



Fixing the motor operator/connecting wires





Terminals:
X5.1 (L-)
X5.2 (L+)

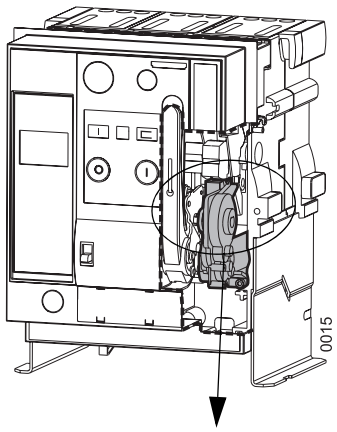
→ Circuit diagrams (→ page 8 – 4)

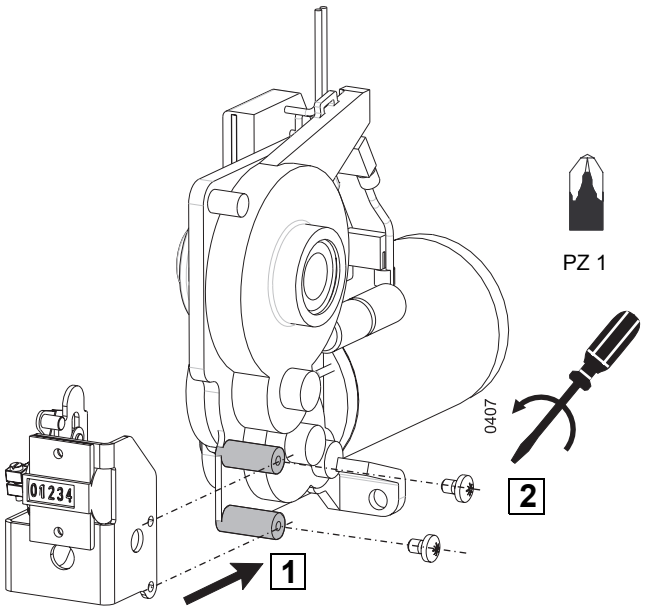
Note

It may be necessary to retrofit missing control-circuit connections (knife contact rail, auxiliary plugs, sliding contacts for connection area).
(→ page 5 – 16 ff)

12.2 Mechanical operations counter

The mechanical operations counter can only be retrofitted when the circuit-breaker is equiped with a motor operator. The make-break operations are also counted if the spring-operated stored-energy mechanism is charged with the manual lever (motor without supply).

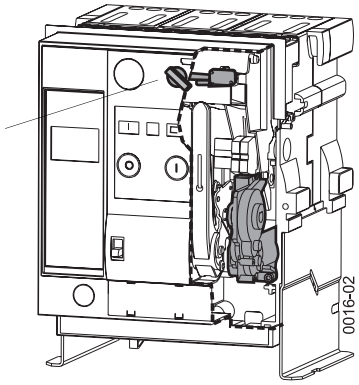




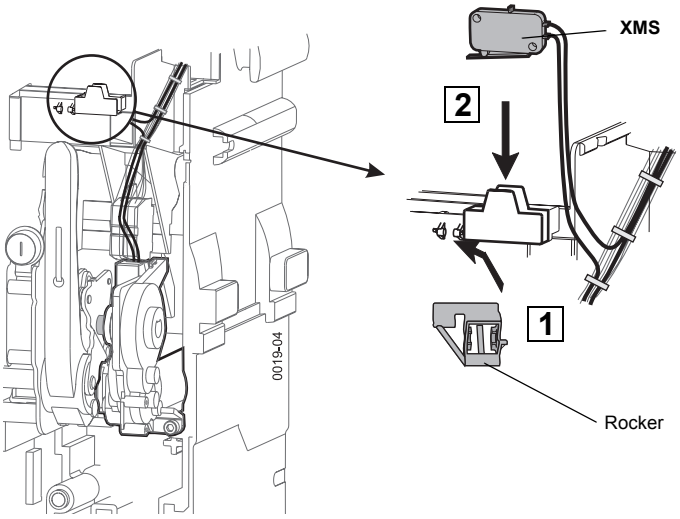
12.3 Motor cut-off switch on the operating panel

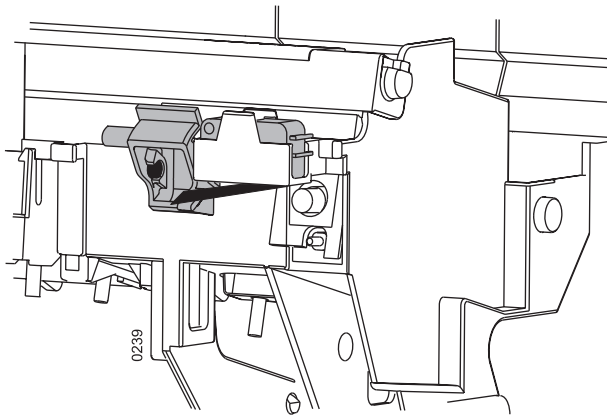
Option.
For de-energizing the motor operator. Supplied pre-assembled with a soldered wire.

Not possible if "electrical ON" available



Installing motor disconnect switch

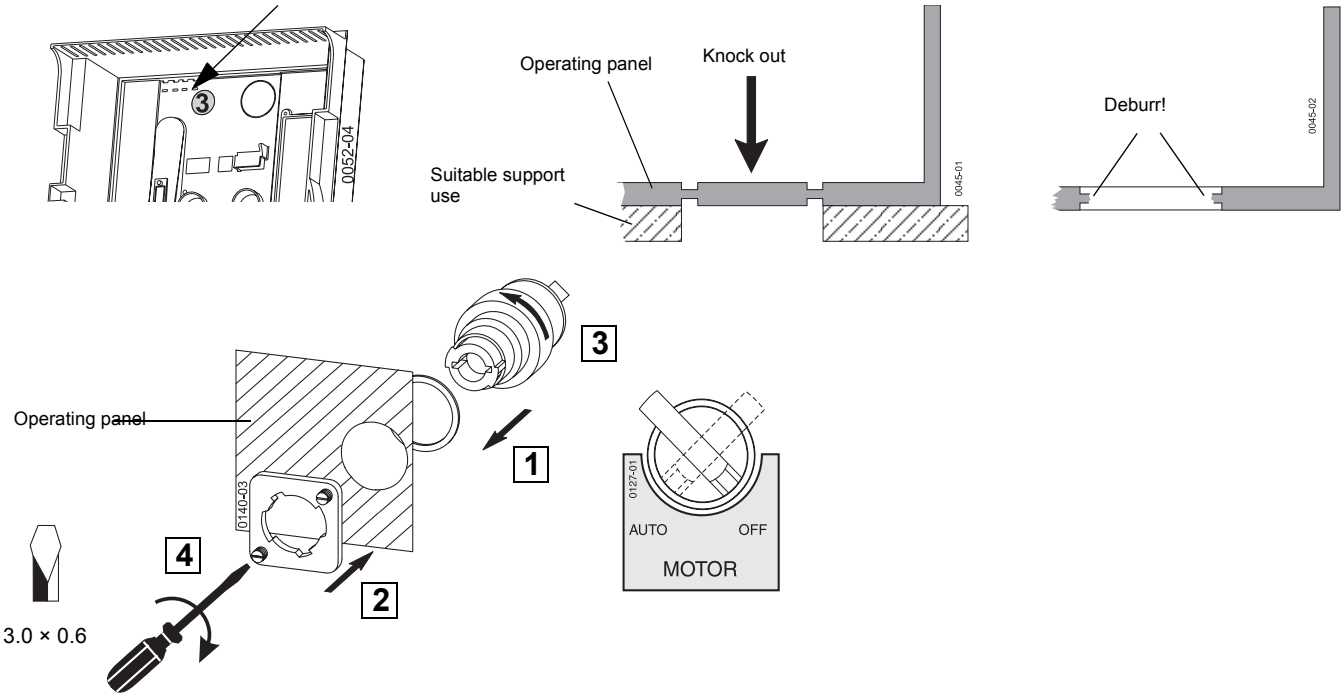




Connecting motor disconnect switch

– Open terminal X5.1 and disconnect wire X5-1 (wire from motor operating mechanism)
– Connect wire X5-1 of the disconnect switch XMS to terminal X5.1
– Route wire X5-1 of the motor operating mechanism to terminal lug 4 of the disconnect switch and solder it there.

Installing the selector knob

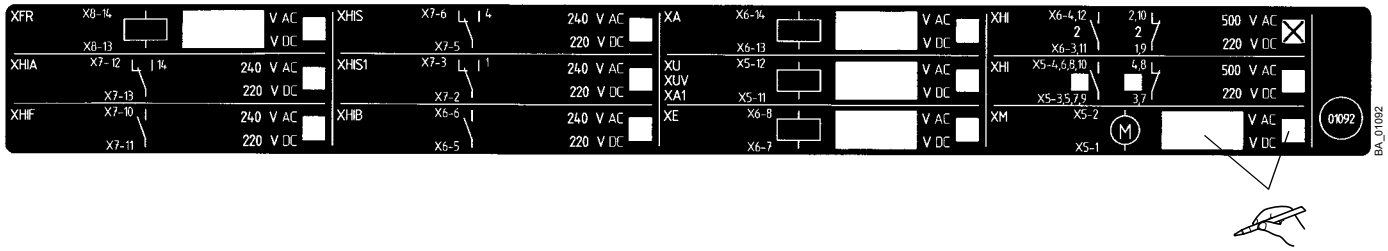


Note

It may be necessary to retrofit missing control-circuit connections (knife contact rail, auxiliary plugs, sliding contacts for connection area).
(→ page 5 – 16 ff)

12.4 Updating the options label

Use an indelible ink pen



13 Voltage releases, closing coil, electrical ON

13.1 Overview

Closing release	AC V 50/60 Hz	DC V	Part no.	Single part no.
Closing release XE (100 % duty factor, suitable for continuous operation)	–	24	+IZM-XE24DC	IZM-XE/A24DC
	–	30	+IZM-XE30DC	IZM-XE/A30DC
	–	48	+IZM-XE48DC	IZM-XE/A48DC
	–	60	+IZM-XE60DC	IZM-XE/A60DC
	110	110	+IZM-XE110AC/DC	IZM-XE/A110AC/DC
	230	220	+IZM-XE230AC/220DC	IZM-XE/A230AC/220DC
Overexcited closing release XE (5 % duty factor, not suitable for continuous operation)	–	24	+IZM-XE24DC05	IZM-XE/A24DC05
	–	48	+IZM-XE48DC05	IZM-XE/A48DC05
	110-127	110-125	+IZM-XE110AC/DC05	IZM-XE/A110AC/DC05
	208-240	220-250	+IZM-XE230AC/DC05	IZM-XE/A230AC/DC05

Signalling switch	Part no.
Signalling switch on 1st voltage release	+IZM-XHIS
Signalling switch on 2nd voltage release	+IZM-XHIS1

Electrical ON	Part no.
Button with sealing cap	+IZM-XEE-TP
Key-operated button CES	+IZM-XEE-C

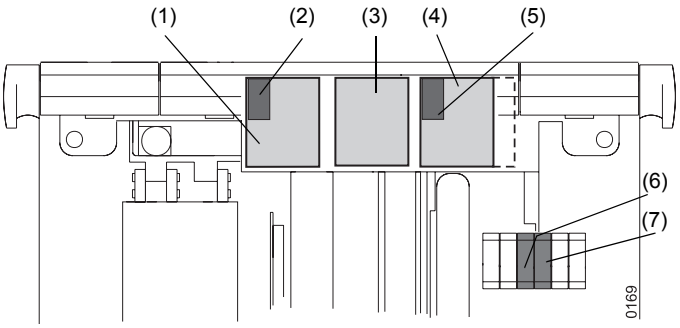
1st voltage release	AC V 50/60 Hz	DC V	Part no.	Single part no.
1st shunt release XA (100 % duty factor, suitable for continuous operation)	–	24	+IZM-XA24DC	IZM-XE/A24DC
	–	30	+IZM-XA30DC	IZM-XE/A30DC
	–	48	+IZM-XA48DC	IZM-XE/A48DC
	–	60	+IZM-XA60DC	IZM-XE/A60DC
	110	110	+IZM-XA110AC/DC	IZM-XE/A110AC/DC
	230	220	+IZM-XA230AC/220DC	IZM-XE/A230AC/220DC
overexcited shunt release XA (5 % duty factor, not suitable for continuous operation)	–	24	–	IZM-XE/A24DC05
	–	48	–	IZM-XE/A48DC05
	110-127	110-125	–	IZM-XE/A110AC/DC05

2nd voltage release	AC V 50/60 Hz	DC V	Part no.	Single part no.
2nd shunt release XA1	–	24	+IZM-XA1(24DC)	IZM-XE/A24DC
	–	30	+IZM-XA1(30DC)	IZM-XE/A30DC
	–	48	+IZM-XA1(48DC)	IZM-XE/A48DC
	–	60	+IZM-XA1(60DC)	IZM-XE/A60DC
	110	110	+IZM-XA1(110AC/DC)	IZM-XE/A110AC/DC
	230	220	+IZM-XA1(230AC/220DC)	IZM-XE/A230AC/220DC
Overexcited shunt release XA1 (5 % duty factor, not suitable for continuous operation)	–	24	–	IZM-XE/A24DC05
	–	48	–	IZM-XE/A48DC05
	110-127	110-125	–	IZM-XE/A110AC/DC05
Undervoltage release XU (non-delayed)	–	24	+IZM-XU24DC	IZM-XU24DC
	–	30	+IZM-XU30DC	IZM-XU30DC
	–	48	+IZM-XU48DC	IZM-XU48DC
	–	60	+IZM-XU60DC	IZM-XU60DC
	110-127	110-125	+IZM-XU127AC/125DC	IZM-XU127AC/125DC
	208-240	220-250	+IZM-XU240AC/250DC	IZM-XU240AC/250DC
	380-415	–	+IZM-XU415AC	IZM-XU415AC
Undervoltage release XUV (delayed)	–	48	+IZM-XUV48DC	IZM-XUV48DC
	110-127	110-125	+IZM-XUV127AC/125DC	IZM-XUV127AC/125DC
	208-240	220-250	+IZM-XUV240AC/250DC	IZM-XUV240AC/250DC
	380-415	–	+IZM-XUV415AC	IZM-XUV415AC

Note

Closing coils and shunt releases have the same construction.
Select part no. IZM-XE/A... when ordering separately.

Mounting locations



(1) 1st shunt release XA
(2) Signalling switch XHIS
(3) Closing release XE
(4) 2nd shunt release XA1 **or** undervoltage release (undelayed) XU **or** undervoltage release (delayed) XUV
(5) Signalling switch XHIS1 **or** S43 (XBSS)
(6) Cut-off switch S14 for shunt release 5 % DF (overexcited)
(7) Cut-off switch S15 for closing release XE 5 % DF (overexcited)

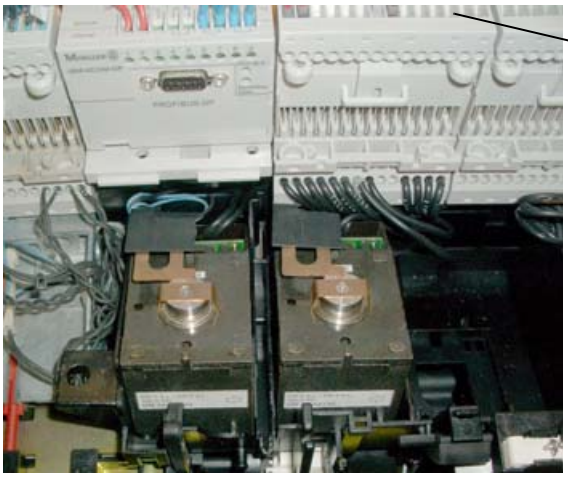
Voltage trips with 100 % DF may be used as an electrical closing lockout.

CAUTION
Check that the closing coil with 5 % duty factor can only be activated when the circuit-breaker is in the ready state. Otherwise the closing release will be destroyed.

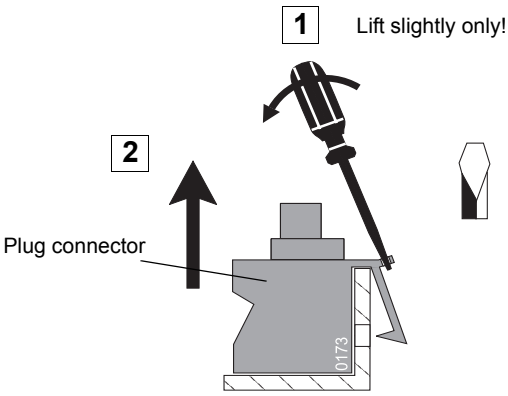
13.2 Retrofitting voltage releases

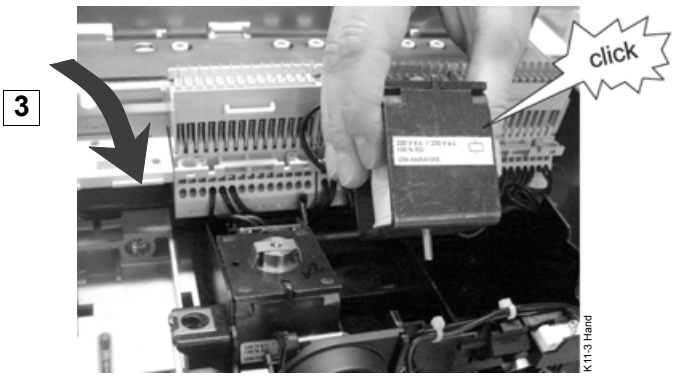
	WARNING
	**Danger of injury!** The switching mechanism could cause personal injury when the operating panel is removed. Before removing the operating panel switch off power and discharge the spring (→ page 24 – 2). – Remove the plug X5 – Press OFF button – Press ON button – Press OFF button once again.

– Remove front panel (→ page 24 – 6)



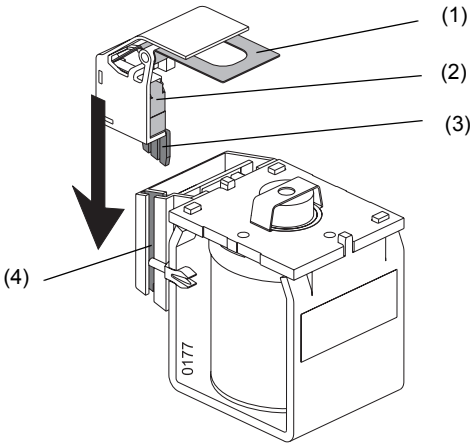
For better mounting remove plug connector.





13.3 Fitting of optional signalling switch on the voltage release

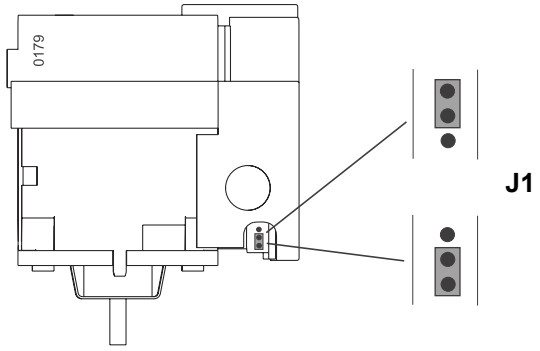
Signals the switch position of the auxiliary release.



(1) See-saw
(2) Signalling switch
(3) Guide
(4) Groove

13.4 Setting delay times on undervoltage release

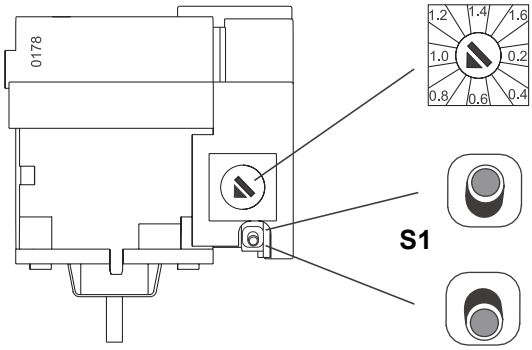
Instantaneous release XU



Short-time delayed: t_d < 200 ms

Instantaneous: t_d < 80 ms

Time-delayed release XUV



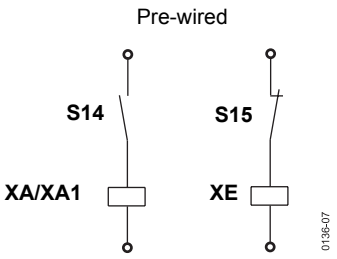
3 x 0.5

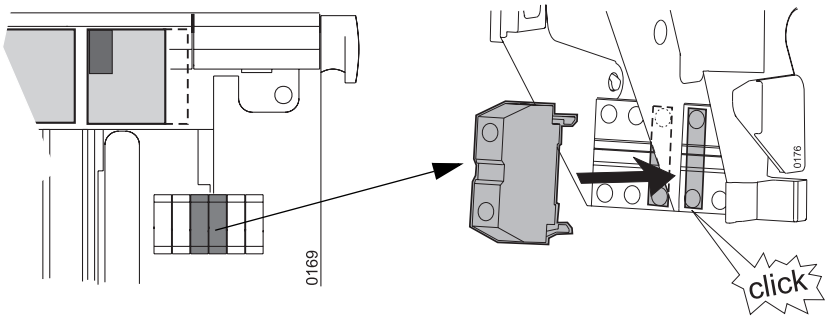
Delay time t_d:

t_d = (0.2 ... 1.6 s) + 1.6 s

t_d = 0.2 ... 1.6 s

13.5 Installation of cut-off switch for overexcited shunt release and closing coil





Note

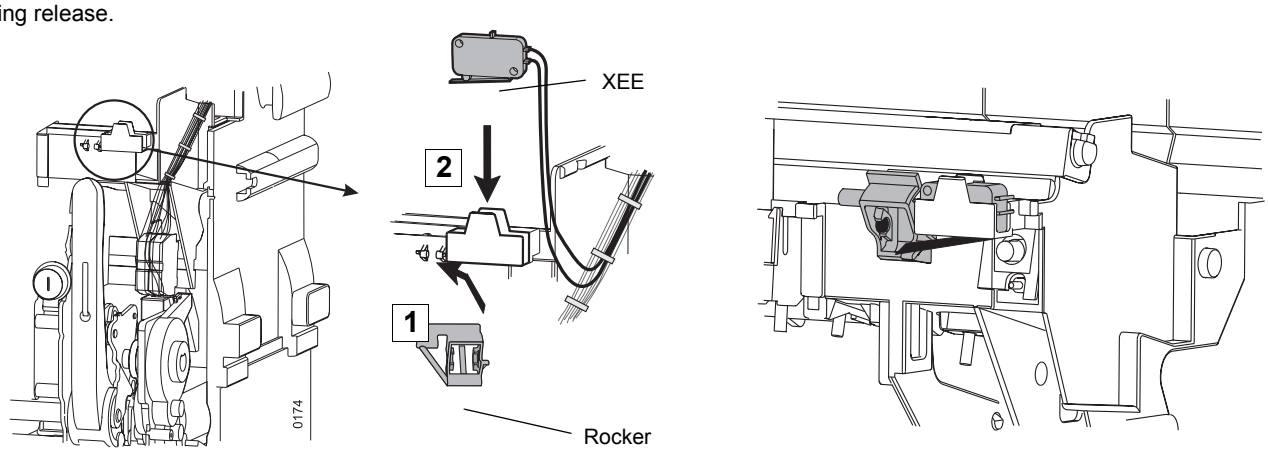
The cut-off switches S14 and S15 are supplied with the XE/A 5% duty factor.

13.6 Retrofitting Electrical ON

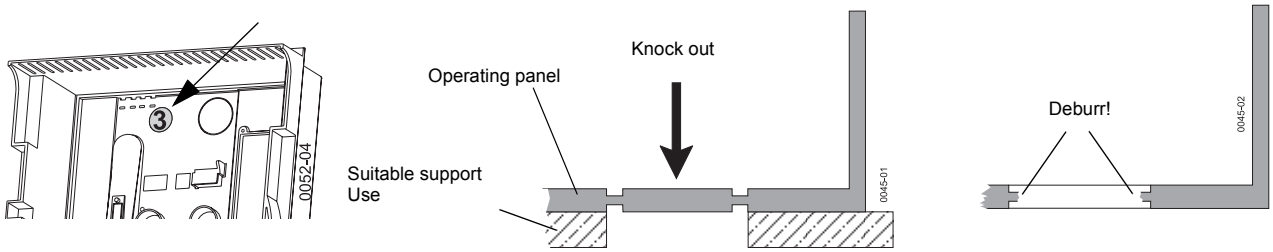
Cannot be combined with a motor cut-off switch.

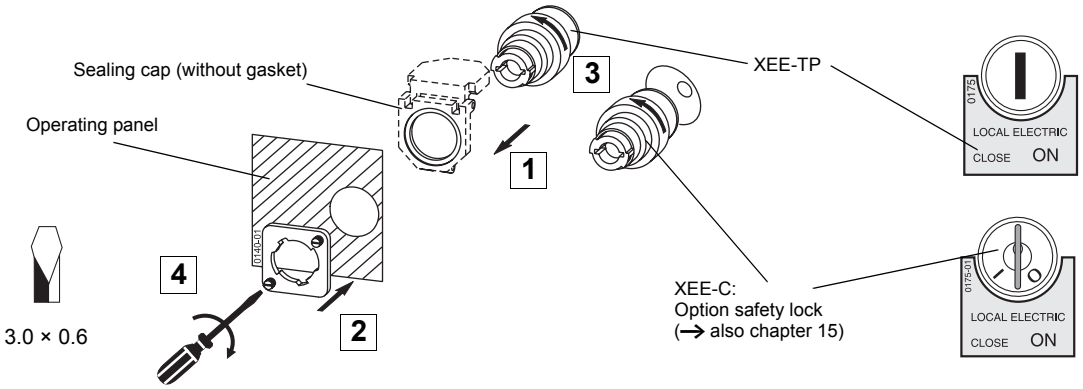
Installing micro-switch

IZM-XEE-TP or IZM-XEE-C can be used only in combination with closing release.



Inserting pushbutton

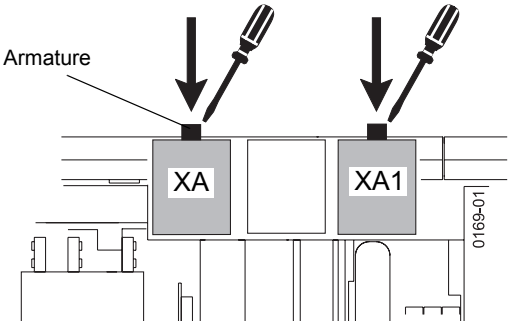
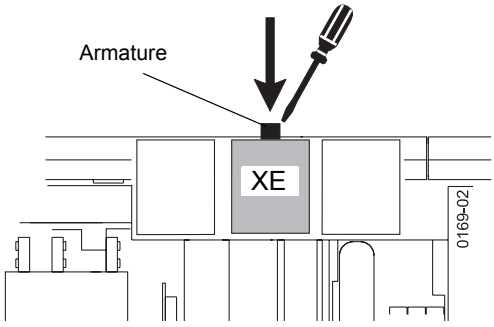
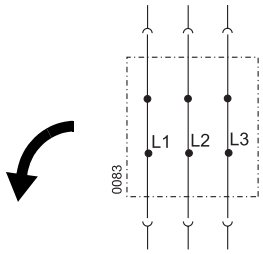
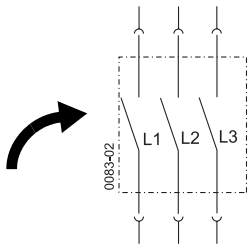




In order to avoid erroneous switch-on: Install a sealing cap XVD (option) on top.

13.7 Mechanical function test

	CAUTION
⚠	Danger if spring is charged!

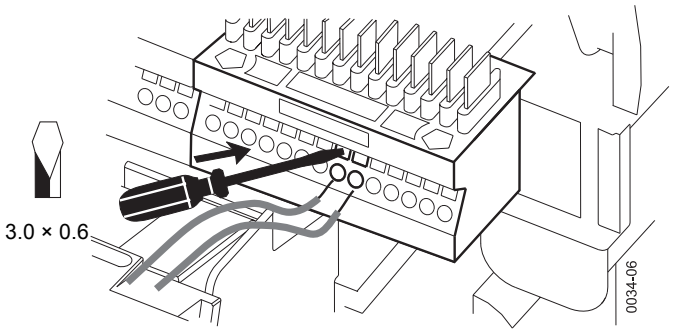
	Shunt release	**Closing release**
1	→ Charge the storage spring manually (page 6 – 4)	
2	→ Closing (page 6 – 5)	
3		
4	 Circuit-breaker off	 Circuit-breaker on
5		→ Switch off (page 6 – 5)

13.8 Connecting wires

Circuit diagrams (→ page 8 – 3)

Note

It may be necessary to retrofit missing control-circuit connections (knife contact rail, auxiliary plugs, sliding contacts for connection area) (→ page 5 – 16).



Terminals

XE : X6.7/X6.8
XA : X6.13/X6.14
XA1, XU : X5.11/X5.12
XUV : X5.11 ... X5.14

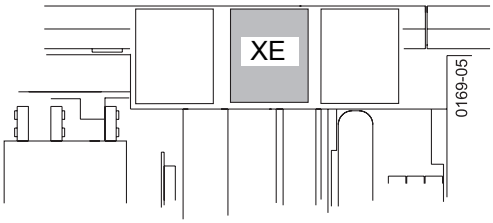
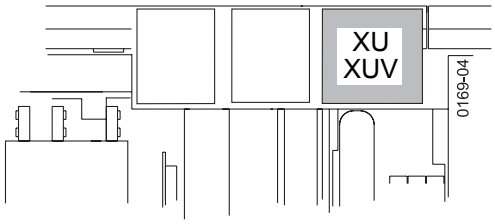
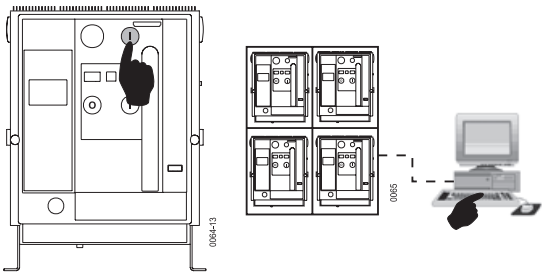
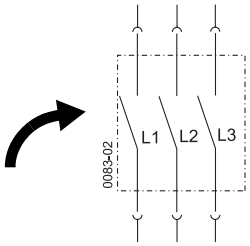
XEE : X7.9/X6.7

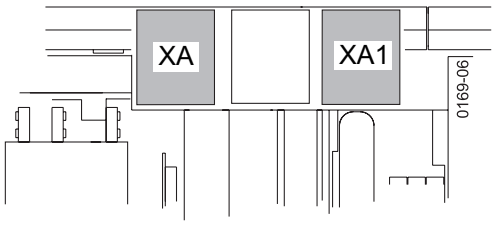
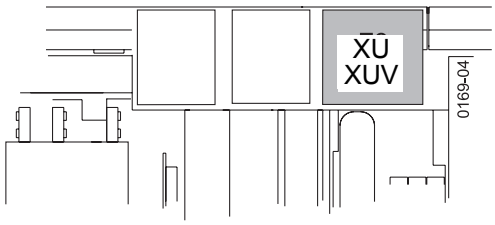
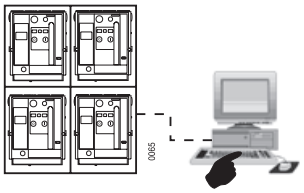
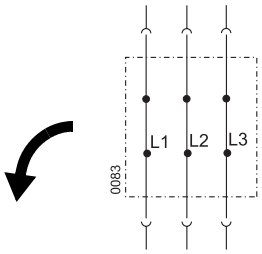
13.9 Finally

– Install front panel (→ page 24 – 13)
– Fitting control circuit plug (→ page 5 – 18)
– Connecting wires to control circuit plug (→ page 5 – 17)
– Withdrawable: move circuit-breaker to test position (→ page 6 – 2)

13.10 Electrical function test

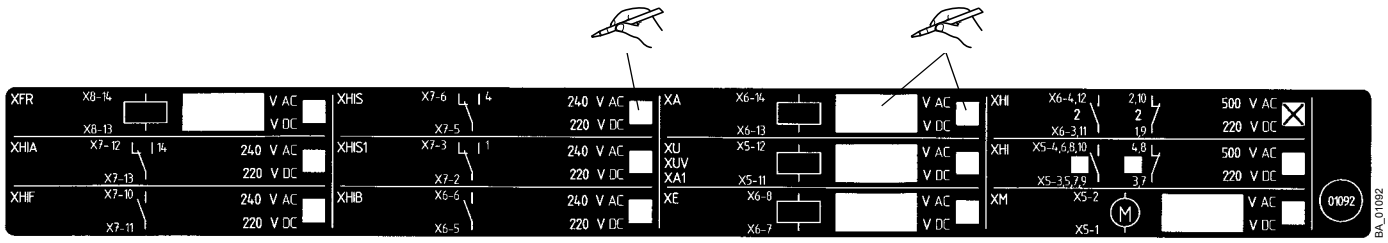
	CAUTION
⚠	This function check must only be carried out with the front panel fitted. The withdrawable circuit-breaker should not be in the connected position.

	Closing release	**Undervoltage release**
1	→ Charge the storage spring manually (page 6 – 4)	
2		
3	**Closing release operation** Electrical ON Remote activation > 200 ms 	 **Interrupt XU/XUV auxiliary voltage!**
4	Circuit-breaker switches **on** 	

	Voltage releases	Undervoltage release
1	→ Charging the spring (page 6 – 4) → Closing (page 6 – 5)	
2		
3	**Actuate voltage release** Remote activation > 200 ms 	**Interrupt XU/XUV auxiliary voltage!**
4	Circuit-breaker switches **off** 	

13.11 Updating the options label

Use an indelible ink pen



13.12 Capacitor storage device

The capacitor storage device NZM-XCM is a upstream device for the shunt release. Without mains power the installed capacitor holds enough power for up to 12 hours to operate the shunt trip once. The configuration of the capacitor unit can be undertaken independently of the circuit-breaker. The NZM-XCM is connected to the incoming side.

Technical data:

Rated operational voltage	U_e	V AC	230
Rated operational current	I_e	mA	< 10
Inrush current (peak value)	I_e	A	3
Connection cross section, single-core- or multi-core with ferrule		mm^2	1 x 0.5 – 2.5) / 2 x (0.5 – 1.5)
		AWG	1 x (20 – 14) / 2 x (20 – 16)

14 Indicator and operating elements

There are additional indicators and operating elements available for retrofitting.

	WARNING
	**Before working on the device be sure to switch off the switchboard and earth the device.**

With retrofitting:

→ Switch off and discharge the spring (page 24 – 2)

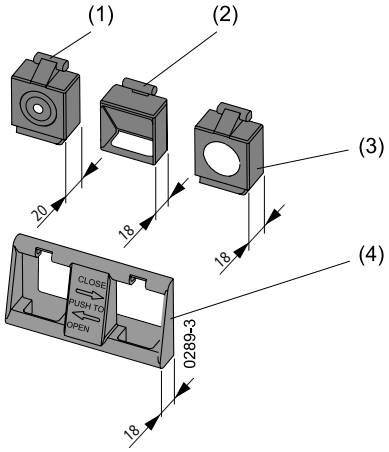
→ Remove front panel (page 24 – 6)

	Designation	**Part no.**
14.1	Locking set for mechanical ON and OFF	IZM-XVD
14.2	Emergency-Stop pushbutton	(+)IZM-XPV
14.3	Key operation for mechanical ON or OFF, including 1 off safety lock, manufacturer CES	(+)IZM-XVD-CES
14.4	Electrical ON pushbutton with key operation, including 1 off safety lock, manufacturer CES	(+)IZM-XEE-C
	Electrical ON pushbutton with sealing flap	(+)IZM-XEE-TP
14.5	Make-break operations counter	(+)IZM-XSZ
14.6	Motor cut-off switch	(+)IZM-XMS

Electrical ON and motor cut-off switch cannot be combined with one another.

14.1 Locking set

The locking set is necessary, if the operation of the mechanical ON and OFF have to be adapted by various accessories, to special operation requirements of the switchboard. (e.g. Emergency-Stop pushbuttons, safety locks, access blocks for tool operation, seals).



Scope of supply:

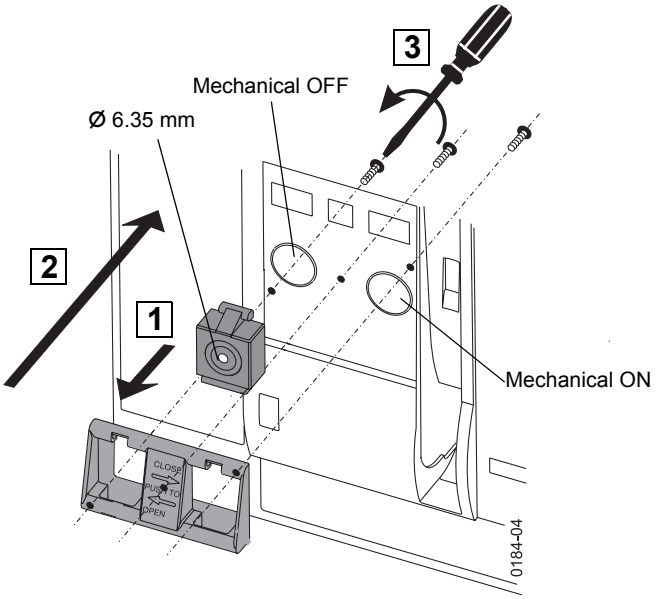
(1) 2 access blocks
(2) 2 off sealing caps for sealing or fitting a padlock
(3) 2 safety lock holders for key operation
(4) 1 baseplate

14.1.1 Retrofitting of access inhibiter over mechanical ON/OFF button

(for tool operation)

Contained in the IZM-XVD locking set.

CAUTION
Tighten self-tapping screws carefully!



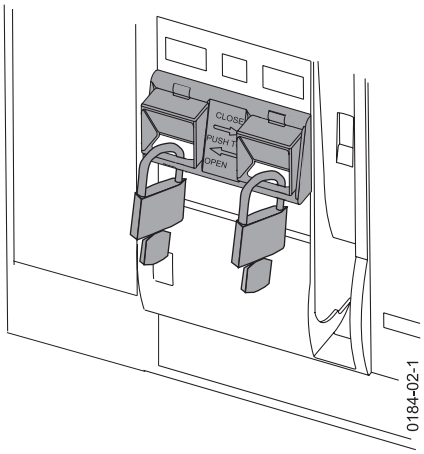
Then:

– Install front panel (→ page 24 – 13)

14.1.2 Locking device for Mechanical OFF/ON button

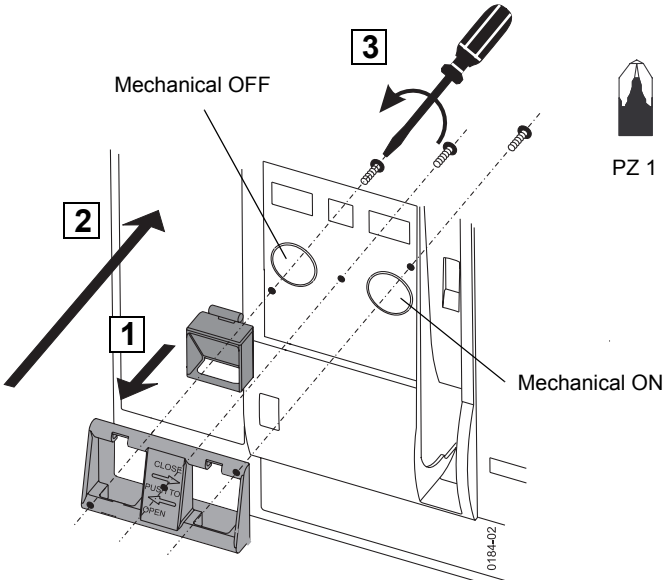
(Can be used for padlock or sealing wire)

Contained in the IZM-XVD locking set. Padlocks are not included.



Retrofitting sealing cap

CAUTION
Tighten self-tapping screws carefully!

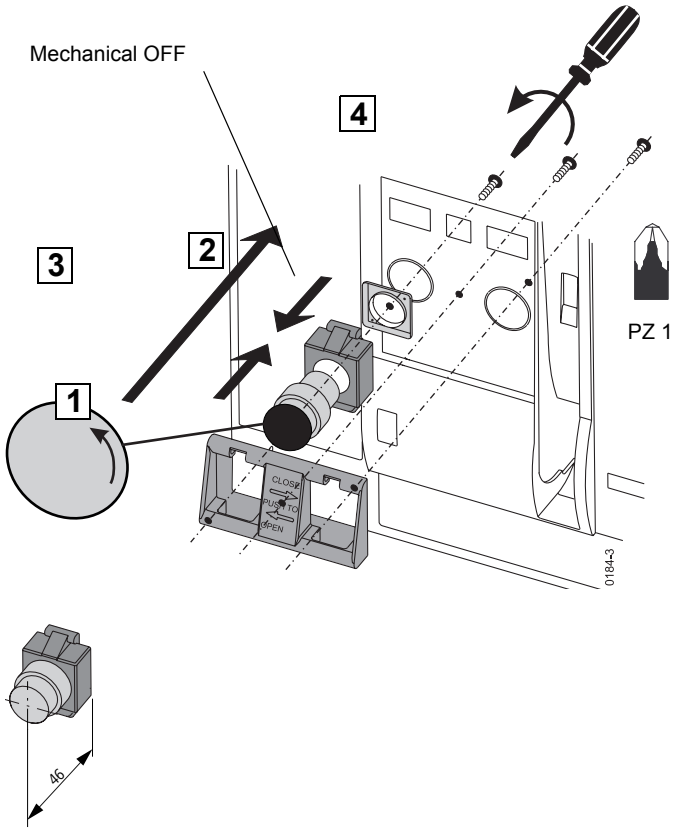


Then:

– Install front panel (→ page 24 – 13)

14.2 Emergency-Stop mushroom-headed pushbutton

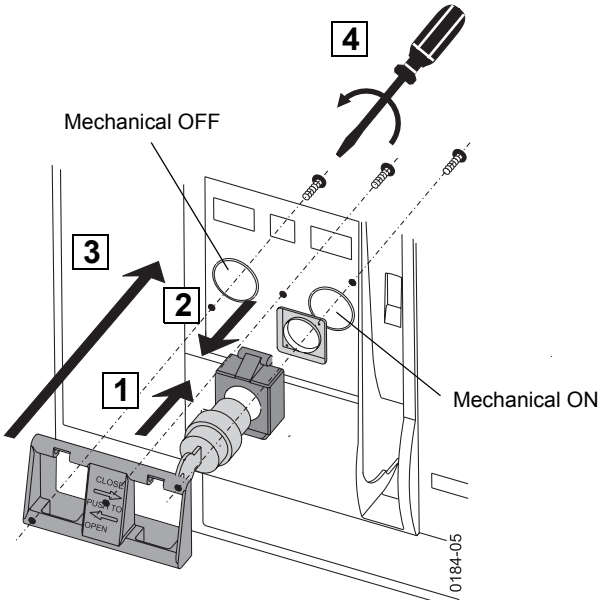
CAUTION
Tighten self-tapping screws carefully!



14.3 Retrofitting for key operation for mechanical ON or OFF

Supplied items: Locking set including padlock, 1 off, manufactured by CES for mechanical OFF or ON.

CAUTION
Tighten self-tapping screws carefully!



Then:

– Install front panel (→ page 24 – 13)

Additional information → page 15 – 1

14.4 Electrical ON pushbutton

– Retrofitting electrical ON (→ page 13 – 5)

– Lock-out device for electrical ON (→ chapter 15)

14.5 Mechanical operations counter

– (→ page 12 – 2)

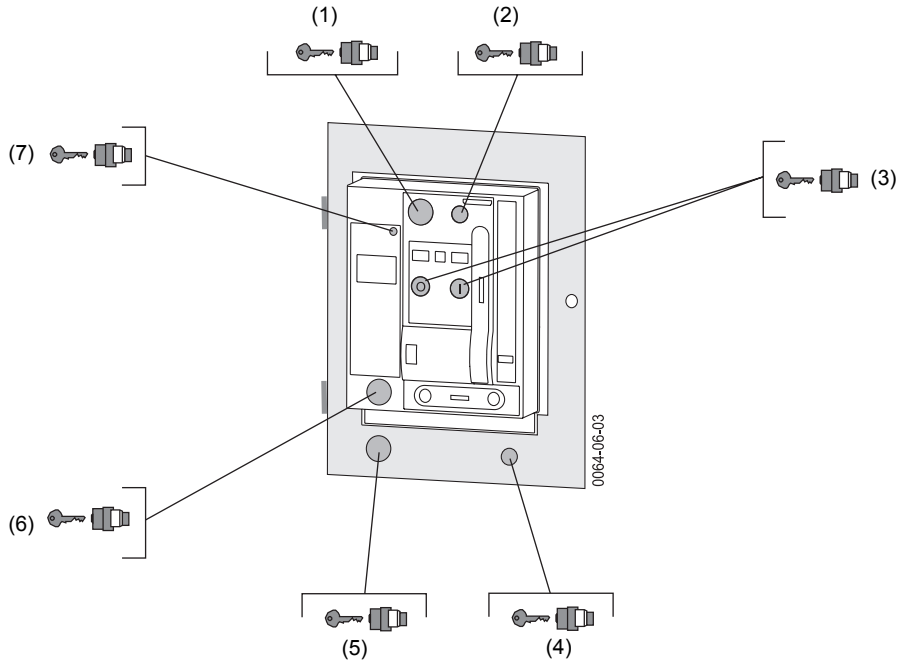
14.6 Motor cut-off switch

– (→ page 12 – 3)

15 Locking devices

15.1 Safety locks

→ Equipment for padlocks (page 15 – 14)



	Safety lock	Reaction	Part no.	Makes
1	Device for locking in OFF position (front panel)	This function prevents closing of the circuit-breaker and fulfils the disconnection conditions in the OFF position according to IEC 60947-2, EN 60947-2. This lock only functions on this circuit-breaker. After an exchange of circuit-breakers the switch-on is no longer prevented as long as the new circuit-breaker is not secured against unauthorised switch-on. To activate the lock, the circuit-breaker must be open. If the circuit-breaker is closed, the locking device is blocked. The block is only effective if the key is withdrawn. The safety key can only be removed in “OFF” position. (→ page 15 – 2)	(+)IZM-XVDM (+)IZM-XVDM-R (+)IZM-XVDME-C The CASTELL lock has to be ordered separately from the manufacturer.	CES RONIS Castell mounting kit
2	Electrical ON with locking device	The locking device prevents unauthorized closing on the front panel. Mechanical closing and remote closing are still possible. The block is only effective if the key is withdrawn.	(+)IZM-XEE-C (Electrical ON without lock-off device page 13 – 5)	CES
3	Key protected operation for Mechanical ON or for Mechanical OFF	Prevents unauthorized mechanical closing. The mechanical ON button can only be pressed if the key is inserted (key operation). Closing via “electrical ON” button and remote closing are still possible. The block is only effective if the key is withdrawn. (→ page 14 – 3) Prevents unauthorized mechanical tripping. The mechanical OFF button can only be pressed if the key is inserted (key operation). Remote tripping is still possible. The block is only effective if the key is withdrawn. (→ page 14 – 3)	(+)IZM-XVD-CES ≙ Locking set IZM-XVD + 1 off cylinder lock	CES
4	Locking device against moving from the disconnected position	Prevents the removal of the hand crank in the disconnected position with withdrawable units. Transmission of the blocking signal from the lock to the circuit-breaker through Bowden cables. Circuit-breaker replacement is possible. The block is only effective if the key is withdrawn. (→ page 15 – 5)	(+)IZM-XV-AV (+)IZM-XV-R-AV Cannot be combined with (+)IZM-XVV, (+)IZM-XVK-AV	CES RONIS

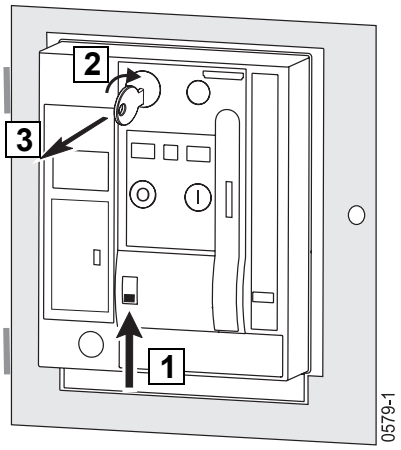
	Safety lock	Reaction	Part no.	Makes
5	Device for locking in OFF position (panel door)	This special function for withdrawable units prevents closing and fulfils the disconnecting condition in OFF position regardless of the circuit-breaker. Unauthorized closing is also not possible after circuit-breaker replacement. To activate the lock, the circuit-breaker must be open. If the circuit-breaker is closed, the locking device is blocked. The block is only effective if the key is withdrawn. The safety key can only be removed in “OFF” position. (→ page 15 – 10)	(+)IZM-XVZ-AV (+)IZM-XVZ-R-AV	CES RONIS
6	Locking device for racking handle	Prevents drawing out of the racking handle. The circuit-breaker is locked against moving. The block is only effective if the key is withdrawn. (→ page 15 – 11)	(+)IZM-XVK-AV Cannot be combined with (+)IZM-XVV, (+)IZM-XV-(R-)AV	CES
7	Locking device against reset trip indicator	A lockable cover prevents pressing the reset button after overcurrent tripping. (→ page 15 – 13)	Included in +IZM-XHB(G) “Cover for setting buttons” (→ page 9 – 45)	

15.1.1 Retrofitting the interlocking mechanism in the OFF position (operating panel) – safe OFF

When the key is removed the circuit-breaker is secure against reclosing.

Locking

To activate the lock the circuit-breaker must be switched off.



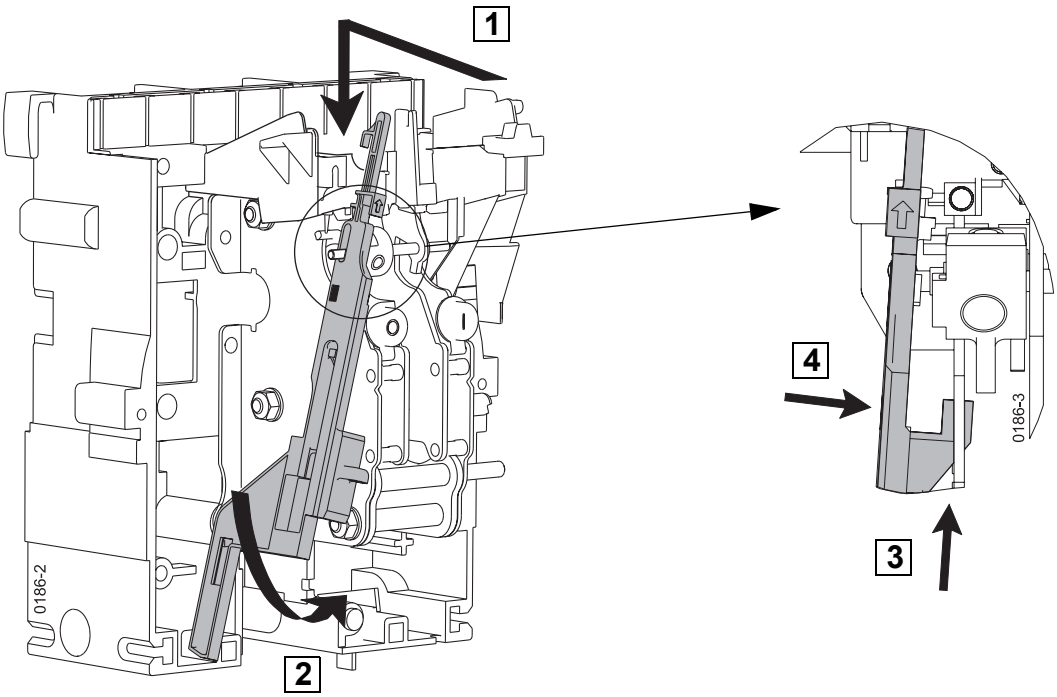
Retrofitting

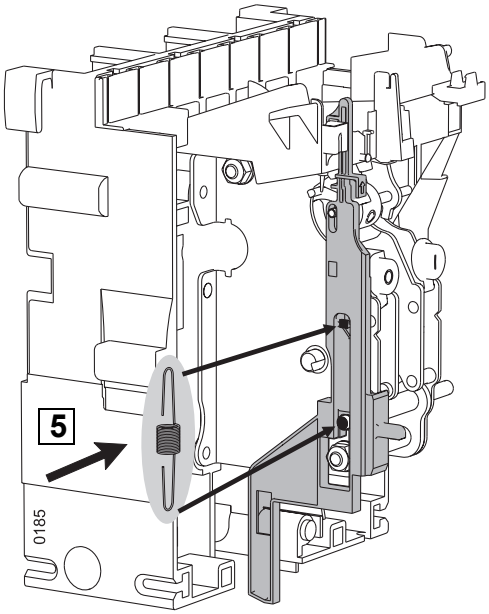
– Switching off and discharging the spring(→ page 24 – 2)
– Remove front panel (→ page 24 – 6)

Fitting control gate

(Already available for withdrawable circuit-breakers)

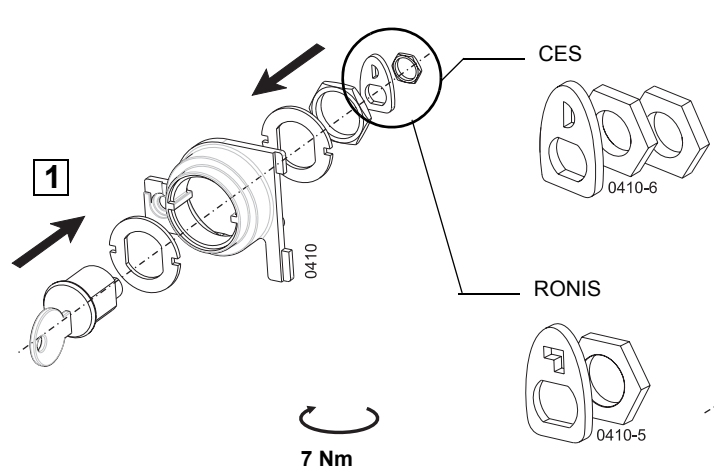
– Remove overcurrent release (→ page 9 – 39)

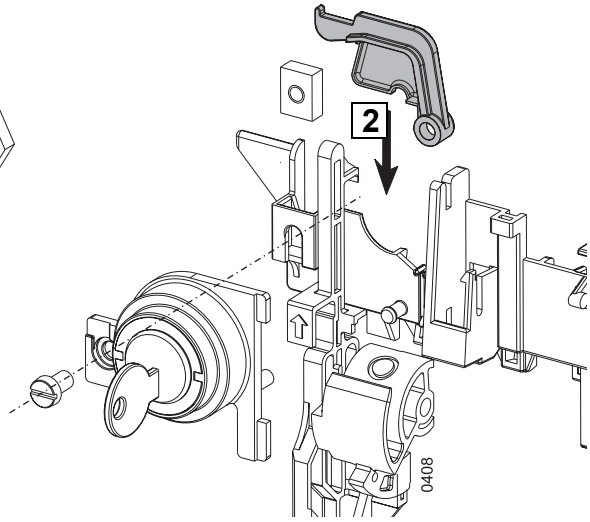


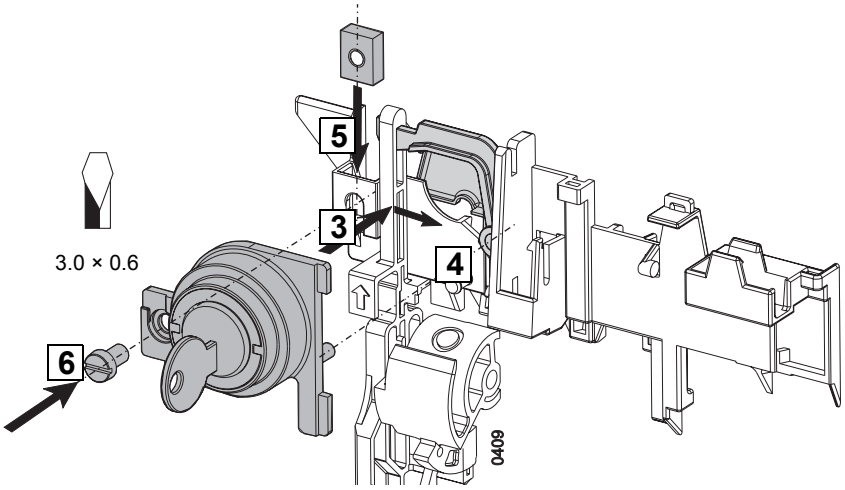


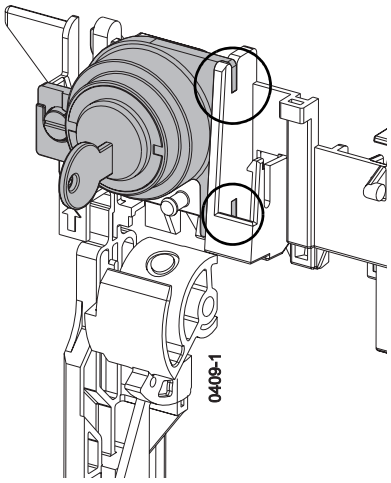
Installing safety lock

For safety lock types: RONIS, CES

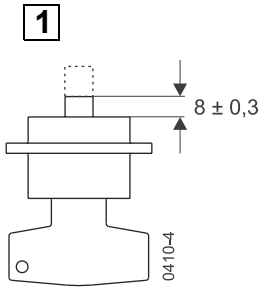


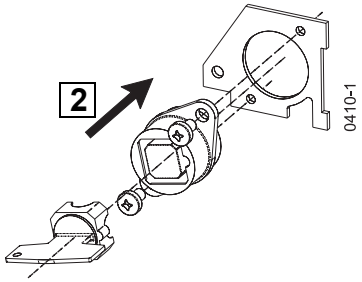


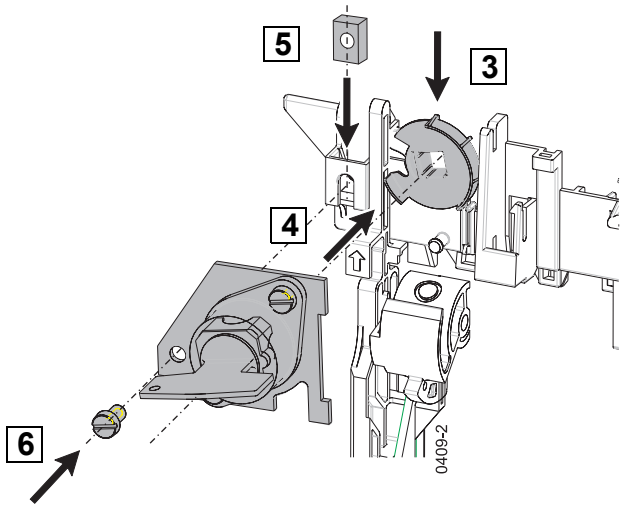




For safety lock type CASTELL



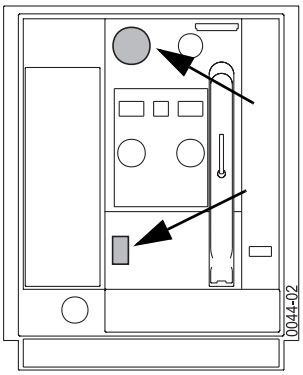


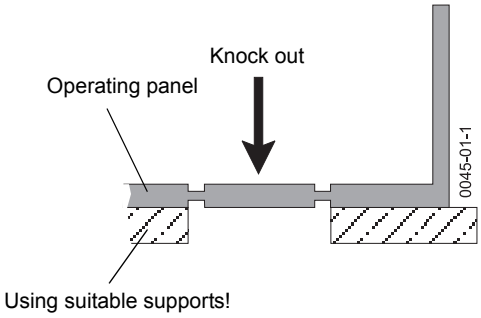


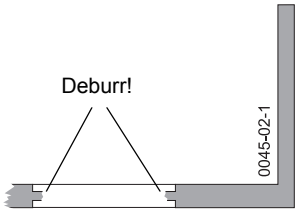
Specification CASTELL lock	
Lock type:	FS2
Symbols (up to 3):	Defined by costumer
Spigot:	Square 9.5 mm^2
Length:	8 mm

Specification CASTELL lock	
Rotation:	65° anticlockwise
Options, accessories, keys:	Defined by costumer

Knock out fields on the front panel







Then:

– Install overcurrent release (→ page 9 – 39)
– Install front panel (→ page 24 – 13)

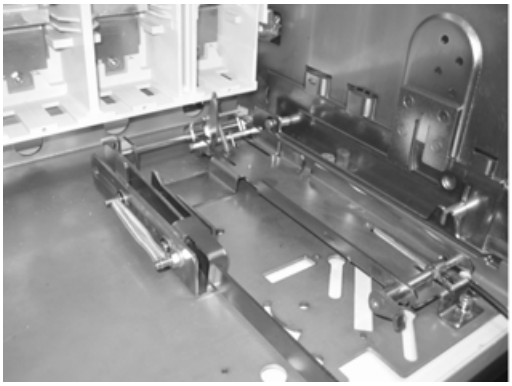
15.1.2 Retrofitting safety lock for electrical ON

– → Retrofitting Electrical ON (page 13 – 5)

15.1.3 Retrofitting for key operation for mechanical ON or OFF

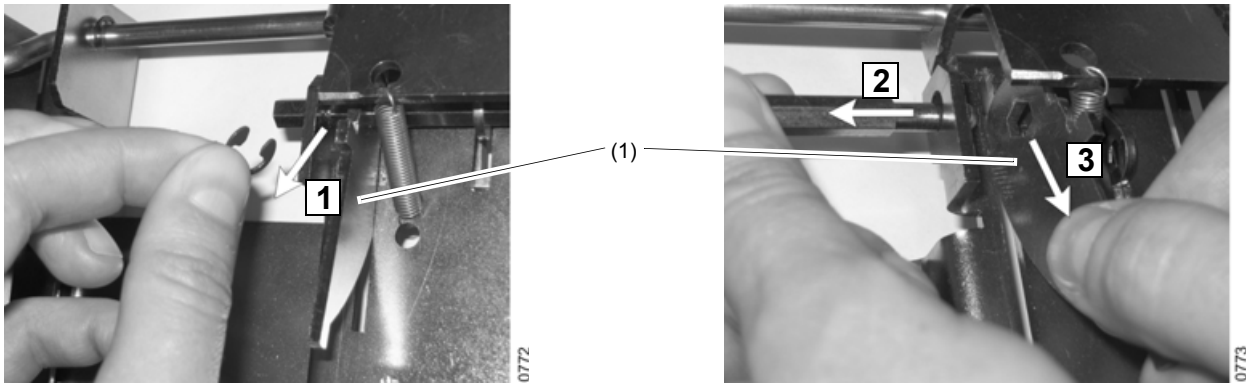
– (→ page 14 – 3)

15.1.4 Retrofitting locking device against moving from the disconnected position



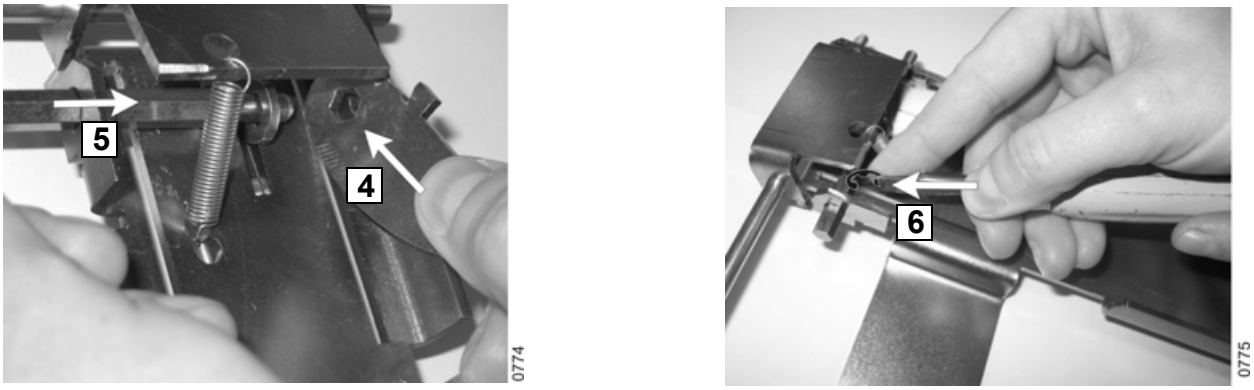
– Switching off and discharging the spring(→ page 24 – 2)
– Remove the circuit-breaker from the withdrawable unit (→ page 24 – 7)

Only for IZM(IN).3-... changing detection plate



(1) detection plate

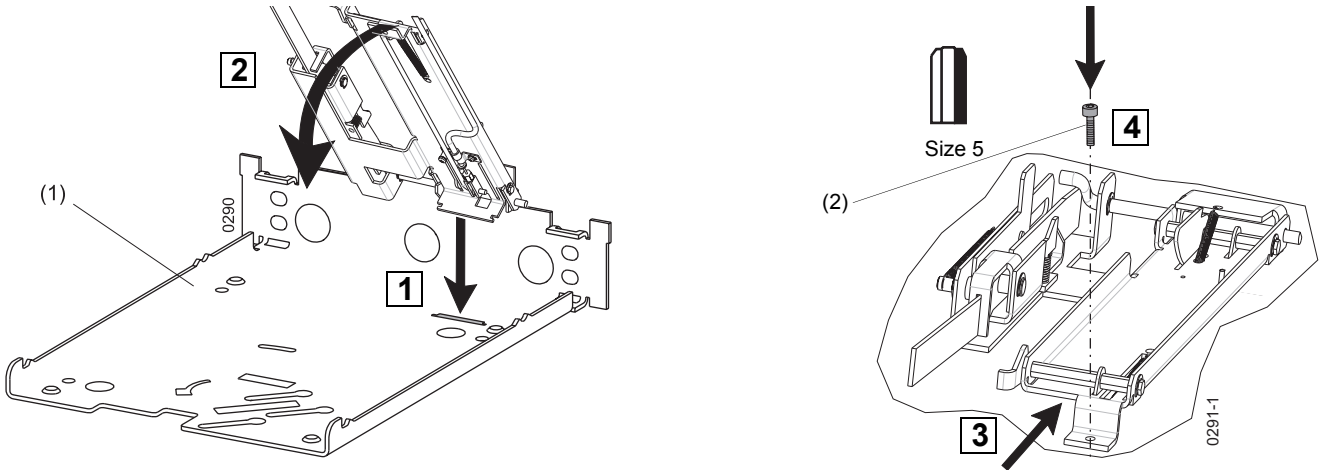
1 remove safety screw
2 pull out shaft
3 remove detection plate



4 place detection plate on the other side
5 push in shaft
6 replace safety screw

Fitting base plate with Bowden cables

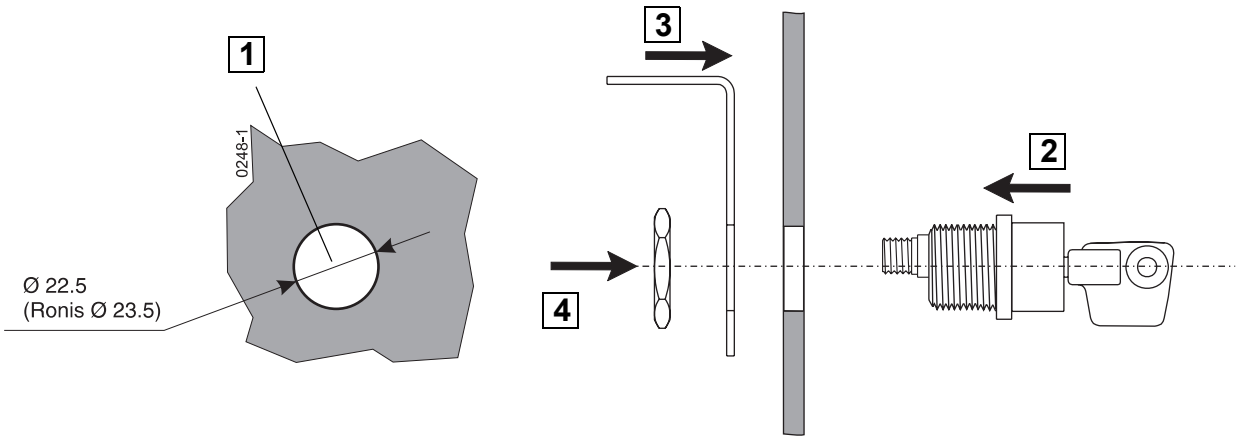
CAUTION
Tighten self-tapping screws carefully!



(1) Withdrawable unit base plate
(2) Self-tapping screw M6

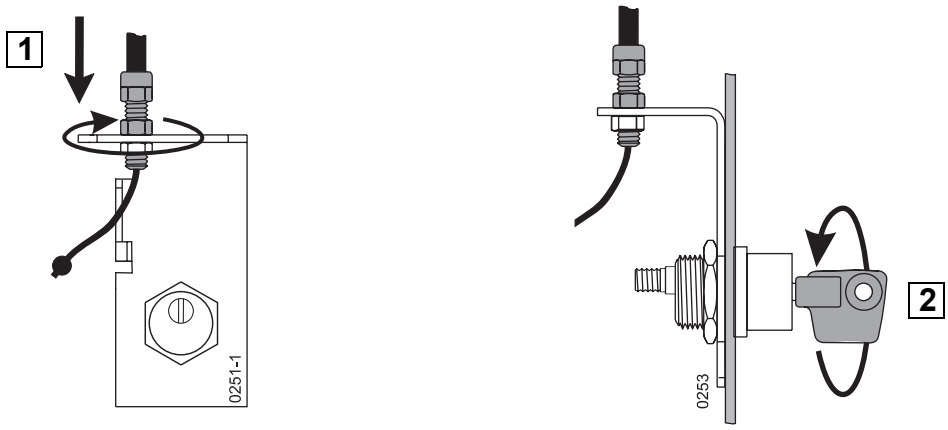
Installing safety lock

Select a suitable position on the switchboard for installation taking into account the length of the Bowden cable and the dimensions of the lock assembly.

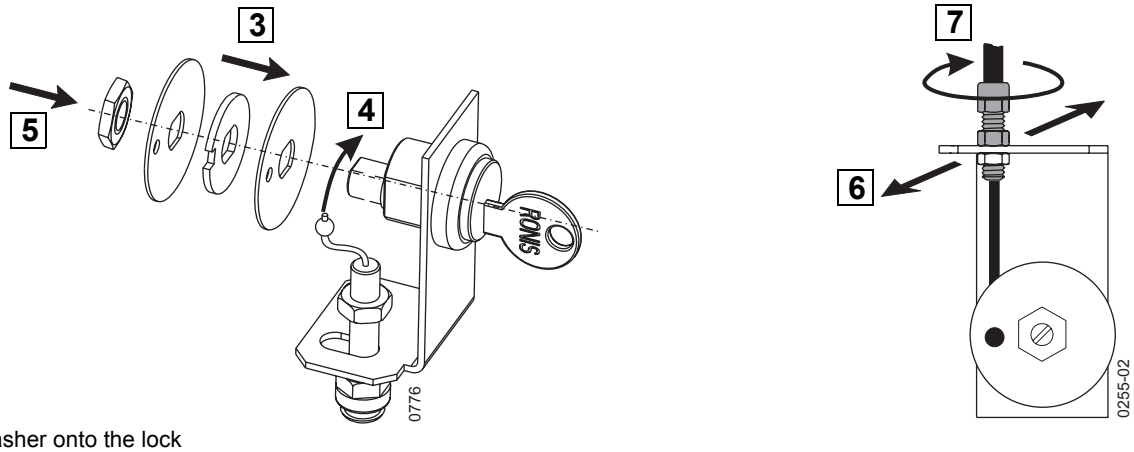


1 Drill hole into panel door
2 **… 4** mount lock assembly

Mount the Bowden cable

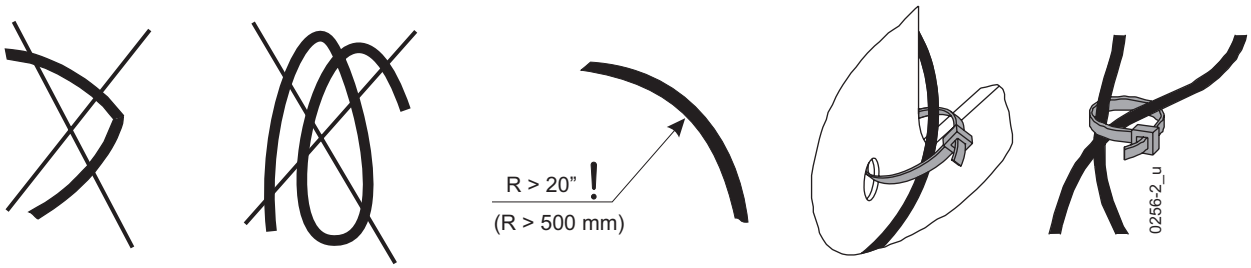


1 Fix the Bowden cable loosely on the bracket
2 Turn the key completely to the left



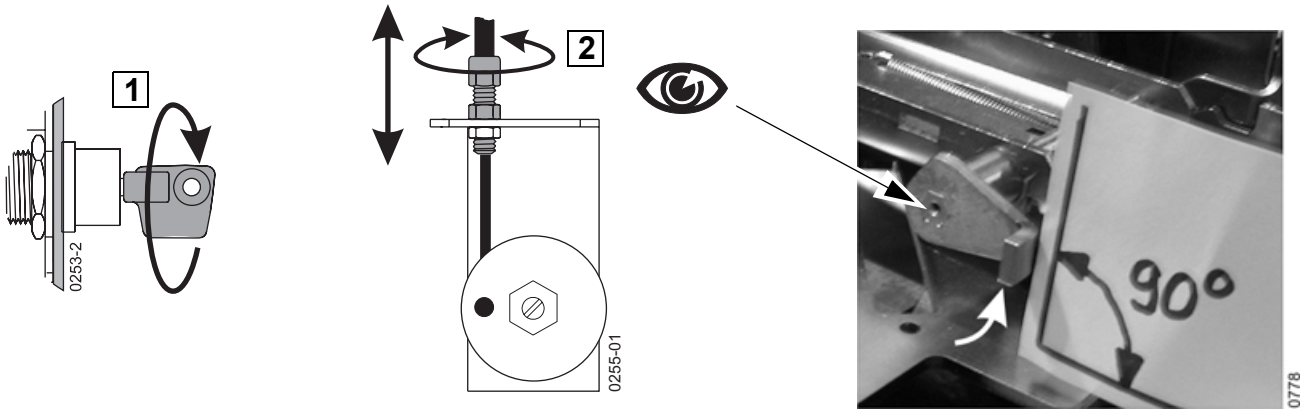
3 Place washer onto the lock
4 Place the ball of the Bowden cable between the washers into the cutout
5 Fix the washers with the nut
6 Arrange the Bowden cable so that the core can run smoothly between the washers.
7 Tighten the Bowden cable

Laying the Bowden cables



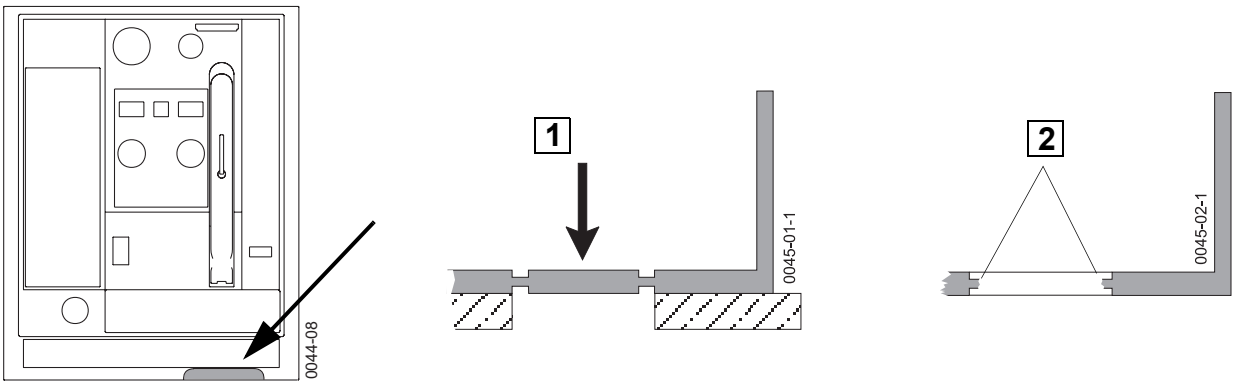
Adjusting the Bowden cables

To adjust, close switchboard door, or when are other routes for the Bowden cable!



1 Turn the key to the right (close)
2 Adjust the Bowden cable until the mechanism is in the vertical position shown

Knock out front panel



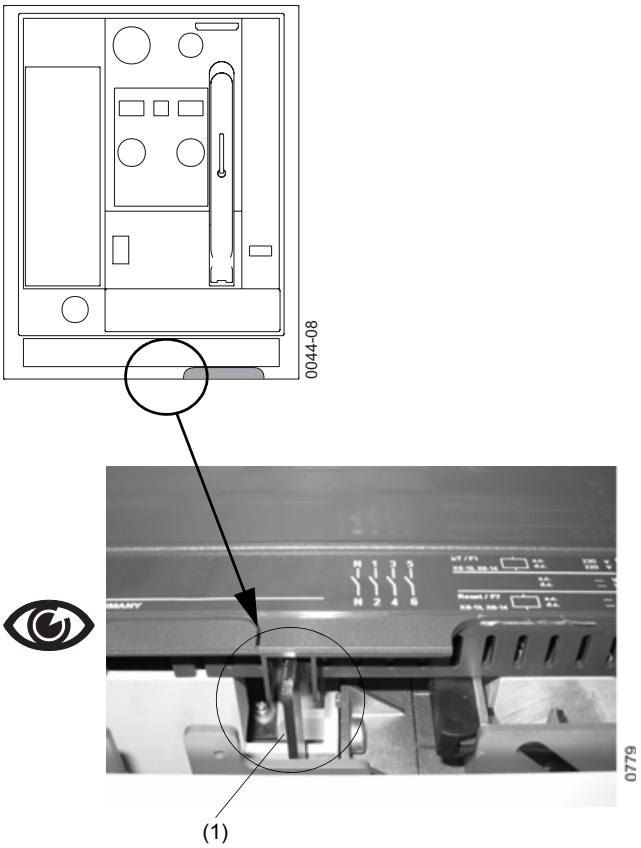
1 Knock-out section from operating panel; use suitable support
2 Deburr the edges

Then:

– Install front panel (→ page 24 – 13)

Final check

– Open interlock
– Place the circuit-breaker in the withdrawable unit and slide to the disconnected position (→ page 6 – 1)
– Check that the lever A is in the middle of the cutout on the operating panel and can move freely. If necessary remove the circuit-breaker and adjust the lever.



(1) Lever A

– Close the panel door
– Rack the circuit-breaker into connected position

Note

The closing interlock against racking from the disconnected position can **only** be activated in the disconnected position or with an empty withdrawable unit.

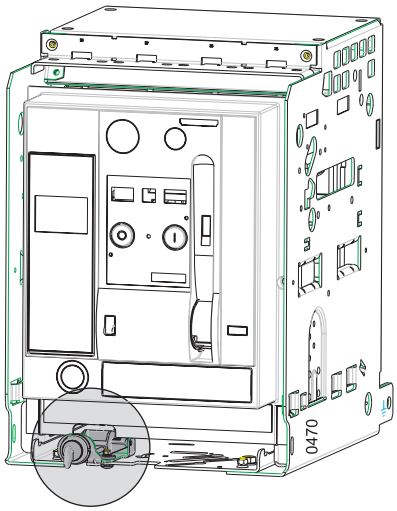
Activation is effected by turning the key clockwise and then withdrawing it.

The key cannot be turned and withdrawn in test or connected position.

When the closing interlock is activated the circuit-breaker cannot be racked or removed from the withdrawable unit. It is also not possible to place a circuit-breaker in the withdrawable unit.

To remove the racking handle block, move the key a little to the right first, so that the block in the lock is released all by itself.

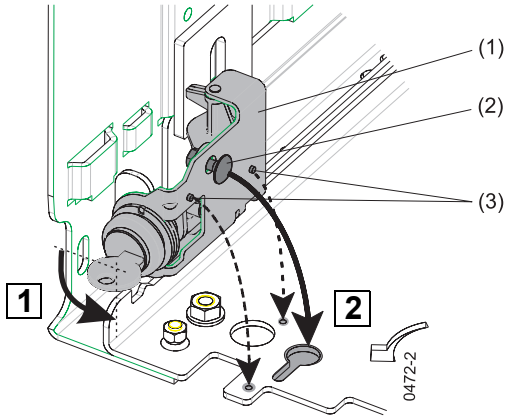
15.1.5 Retrofitting device for locking in the OFF-position (panel door)

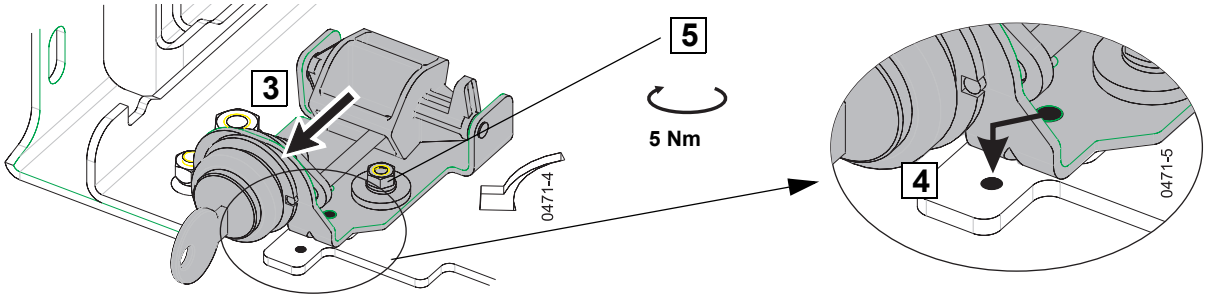


	WARNING
	Before working on the device be sure to switch off the switchboard and earth the device.

– Switching off and discharging the spring(→ page 24 – 2)
– Remove front panel (→ page 24 – 6)

Fitting locking unit



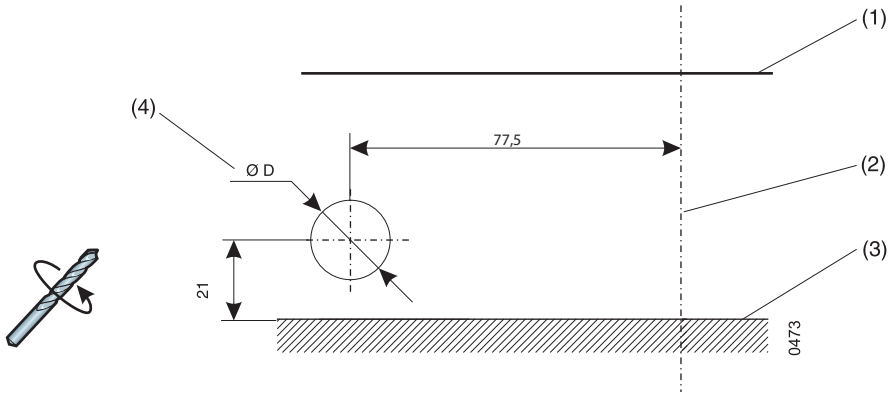


(1) Locking unit
(2) Coach bolt M5 with washer and screw
(3) 2 adjusters

Then:

– Install front panel (→ page 24 – 13)

Drill hole into panel door



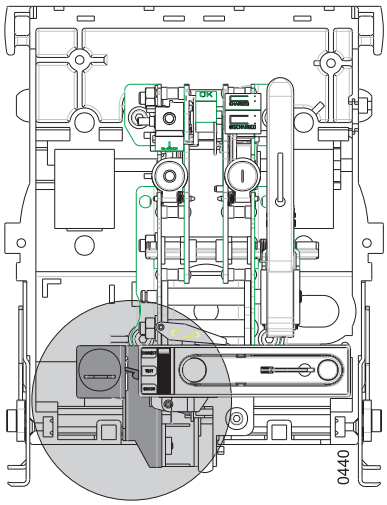
(1) Lower edge of door cut-out
(2) Centre of front panel
(3) Mounting surface of circuit-breaker or of withdrawable unit
(4) Hole diameter D according safety lock type +1 mm

Observe the information on Page 15-2! (mode of oeration)

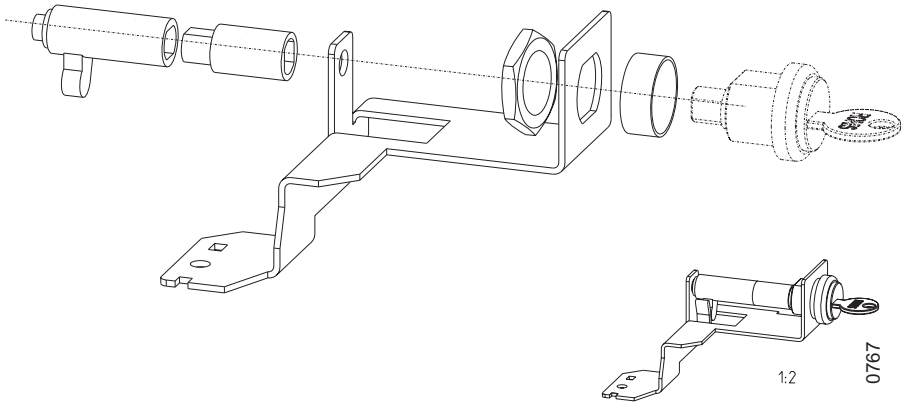
15.1.6 Retrofitting locking device for racking handle

	WARNING
	**Before working on the device be sure to switch off the switchboard and earth the device.**

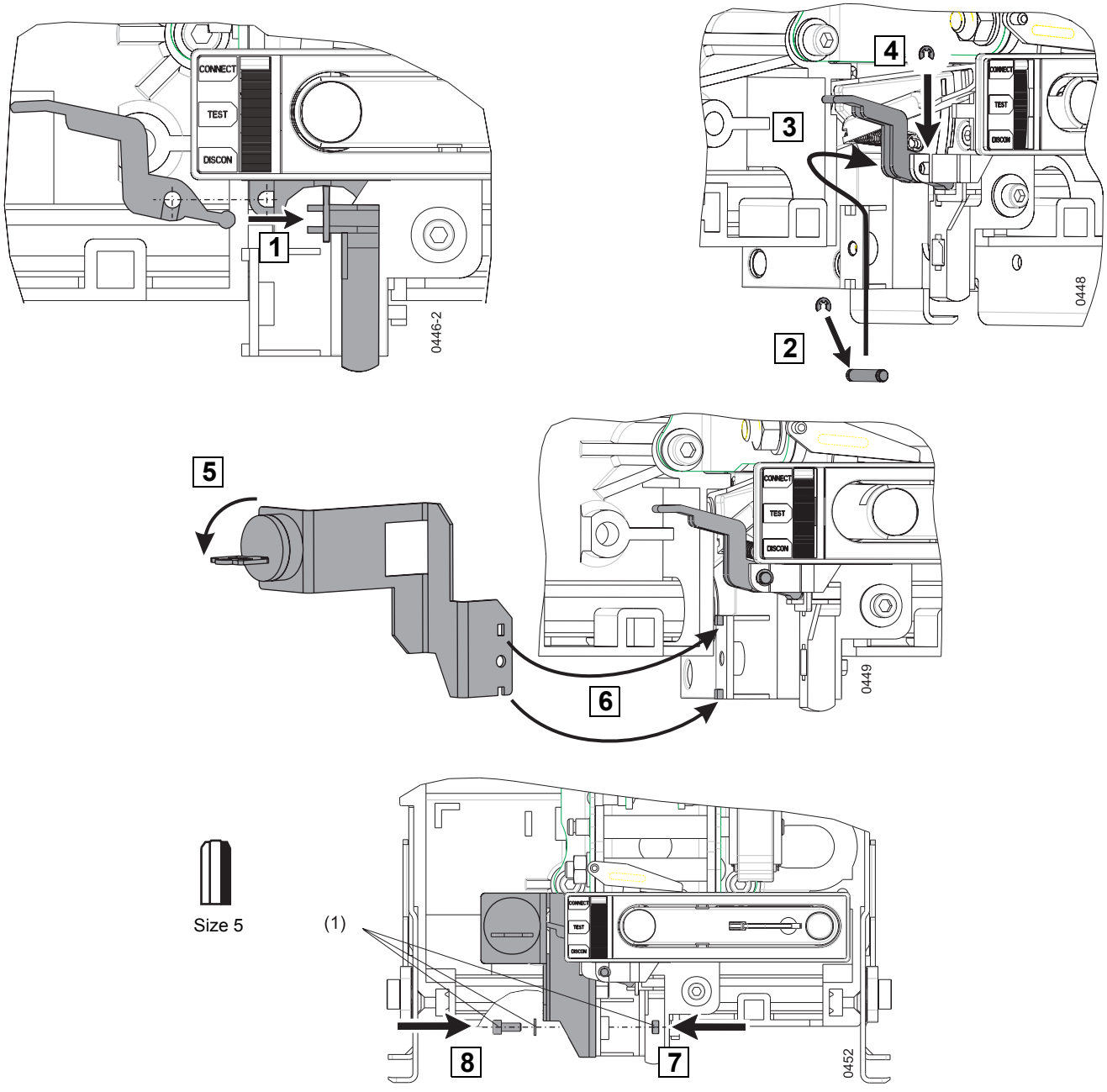
– Switching off and discharging the spring(→ page 24 – 2)
– Remove front panel (→ page 24 – 6)



Lock assembly pre-assembly

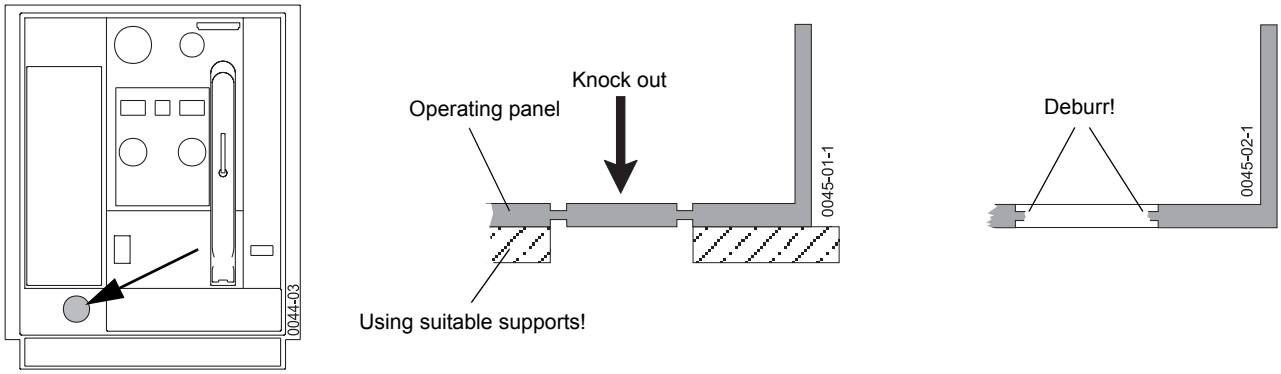


Fitting



(1) Hexagon socket screw M6 with washer and nut

Knock out field on the front panel

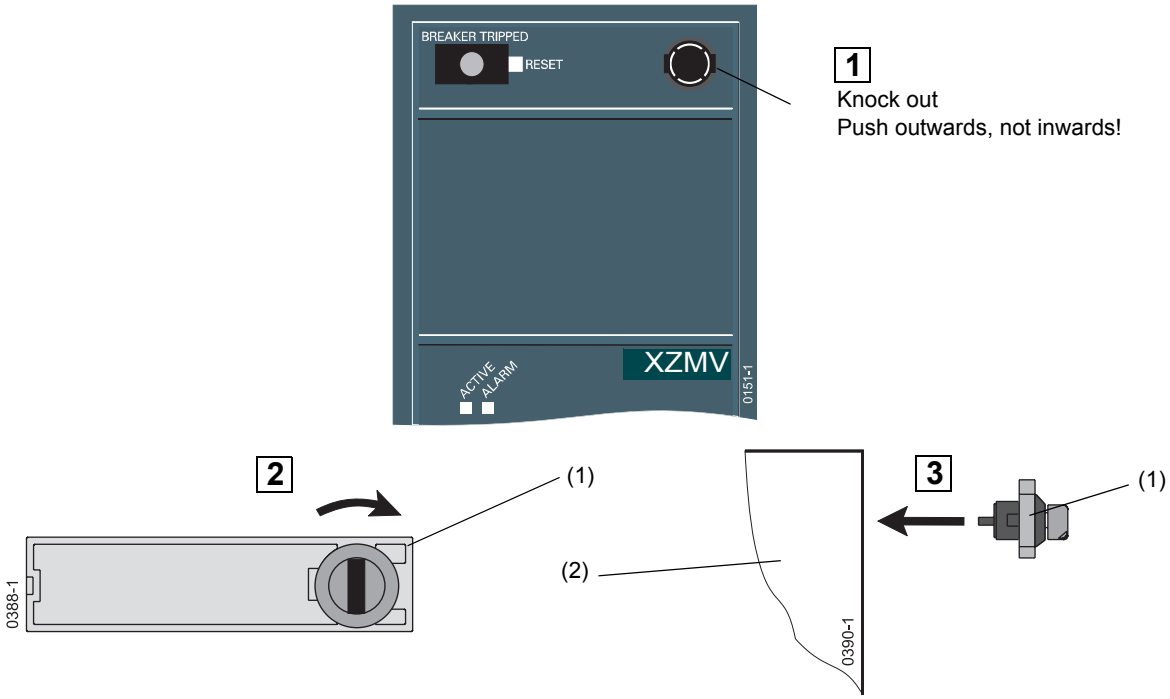


Then:

– Install front panel (→ page 24 – 13)

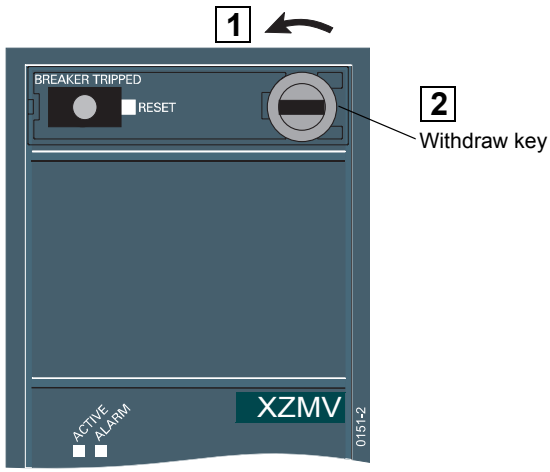
15.1.7 Retrofitting locking device for reset button

– Switching off and discharging the spring(→ page 24 – 2)



(1) Cover with lock
(2) Overcurrent release

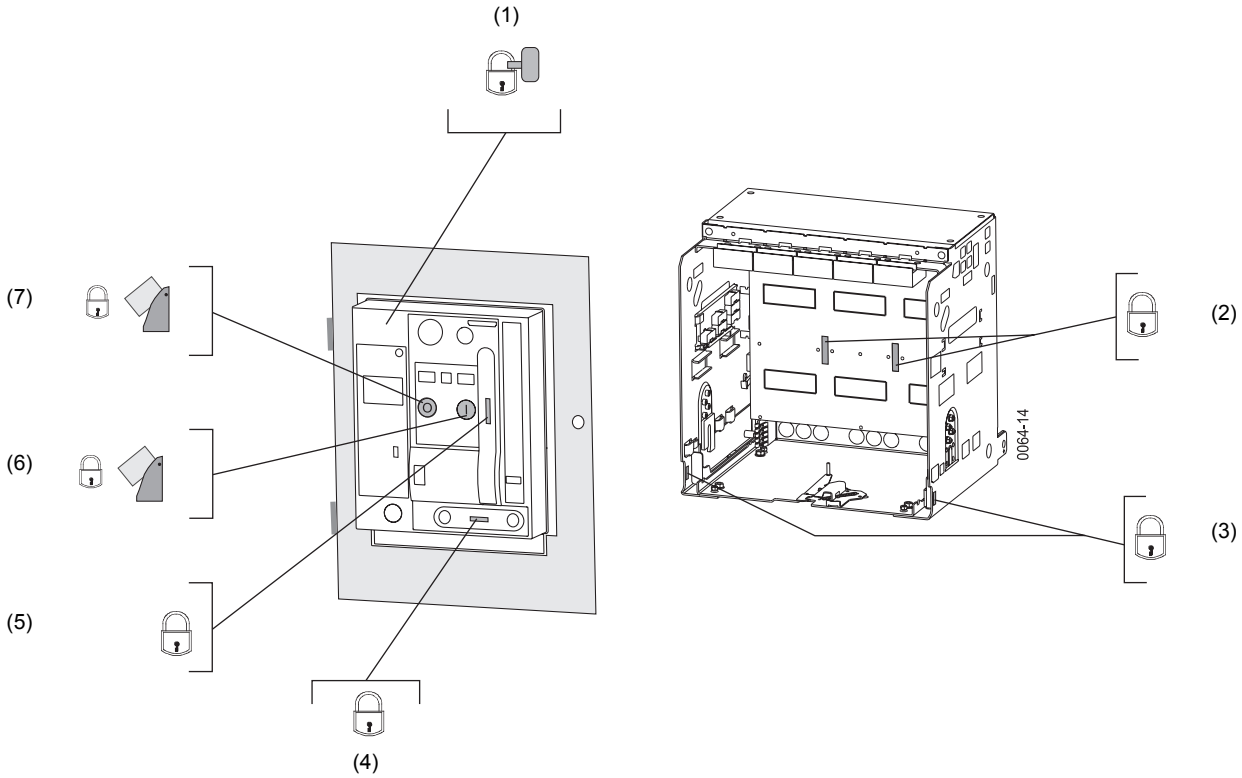
Locking



15.2 Equipment for padlocks

Padlocks are not included.

→ Safety locks (page 15 – 1)

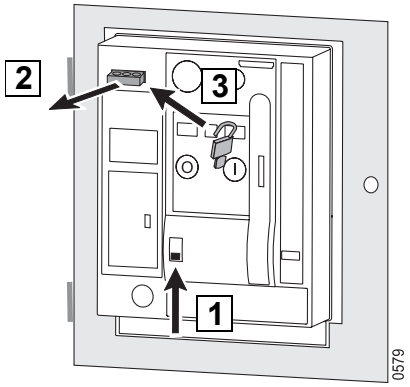


	Locking device	Reaction	Part no.
1	Locking bracket for “Safe OFF”	The locking bracket for “Safe OFF” can be locked with up to 4 padlocks Ø 6 mm. The circuit-breaker cannot be closed and the disconnecting condition in OFF position is fulfilled.	(+)IZM-XVDMV
2	Shutters	If the circuit-breaker has been taken out, the shutters can be padlocked in various positions. (→ page 15 – 16)	Standard
3	Guide rails	The guide rails can be locked with 2 padlocks so that they cannot be drawn out anymore. It is not possible to insert a circuit-breaker in the withdrawable unit. (→ page 15 – 17)	Standard with withdrawable units
4	Racking handle	Drawing out of the racking handle can be prevented by fitting a maximum of 3 padlocks. The circuit-breaker is locked against moving. (→ page 15 – 18)	Standard with withdrawable units
5	Spring charging lever	The spring charging lever can be padlocked. The storage spring then cannot be charged manually. (→ page 15 – 18)	IZM-XVS
6	Mechanical ON	Operation of the mechanical ON button can be prevented by locking the sealing cover with a maximum of 3 padlocks. Closing via “electrical ON” button and remote closing are still possible. (→ page 14 – 2)	This locking device is included in the (+)IZM-XVD locking set.
7	Mechanical OFF	Operation of the mechanical OFF button can be prevented by locking the sealing cover with a maximum of 3 padlocks. Remote tripping is still possible. (→ page 14 – 2)	This locking device is included in the (+)IZM-XVD locking set.

15.2.1 Locking bracket for “Safe OFF”

If the locking bracket is pulled out and the padlock is fitted, the circuit-breaker is secured against closing.

Locking

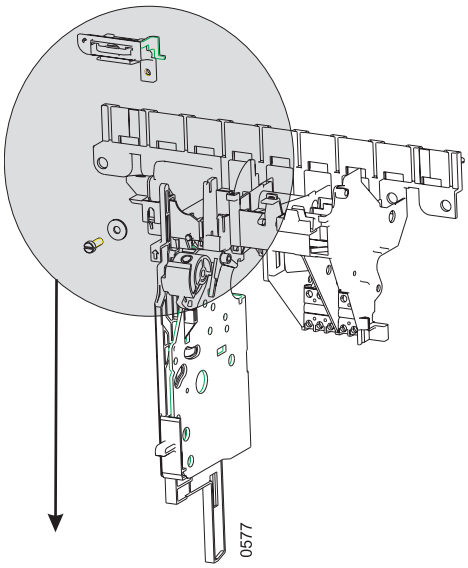


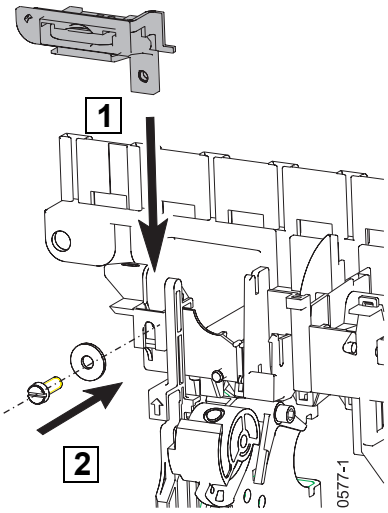
Retrofitting

	WARNING
	**Before working on the device be sure to switch off the switchboard and earth the device.**

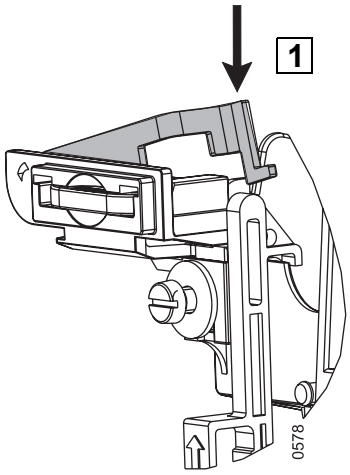
– Switching off and discharging the spring(→ page 24 – 2)
– Remove front panel (→ page 24 – 2)
– Install control gate if not available (→ page 15 – 3)

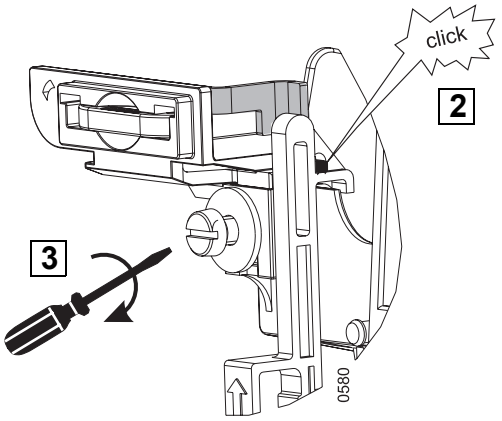
Fitting locking bracket



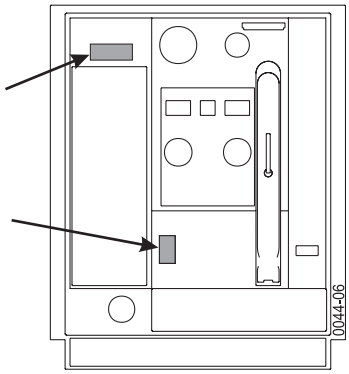


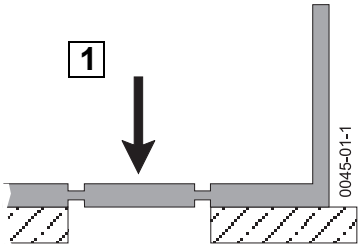
Latching plate in control gate

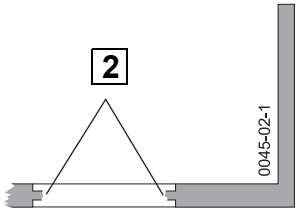




Knock out front panel







1 Knock-out section from operating panel; use suitable support
2 Deburr the edges

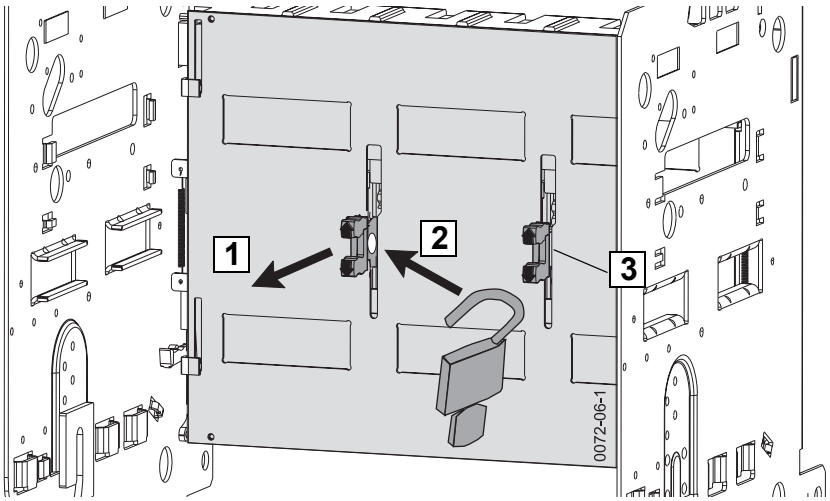
Then:

– Install front panel (→ page 24 – 13)

15.2.2 Locking device for shutters

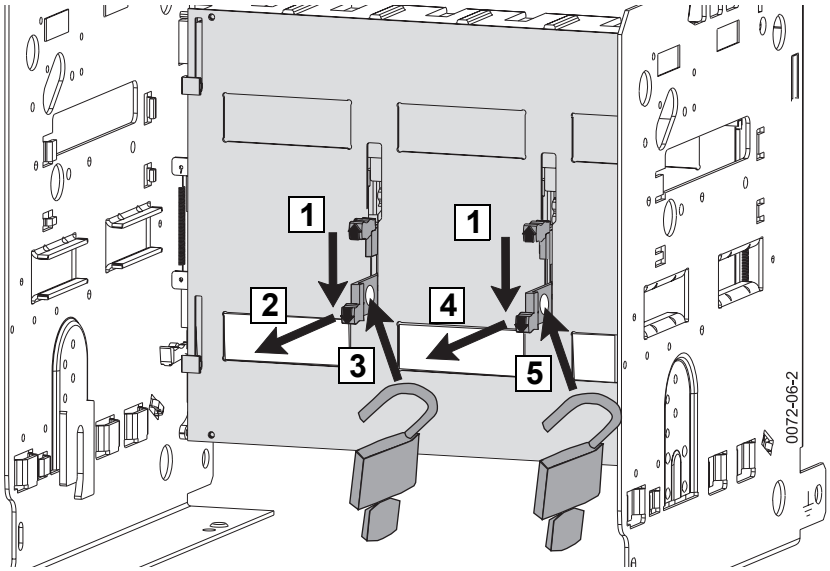
The shutters can be padlocked in various positions, e.g.:

Shutter totally closed



1 Pull both strip raisers to the front until the elongated hole is visible.
2 Fit padlock and lock
3 Proceed in the same way with the other two strip raisers

Shutter below opened

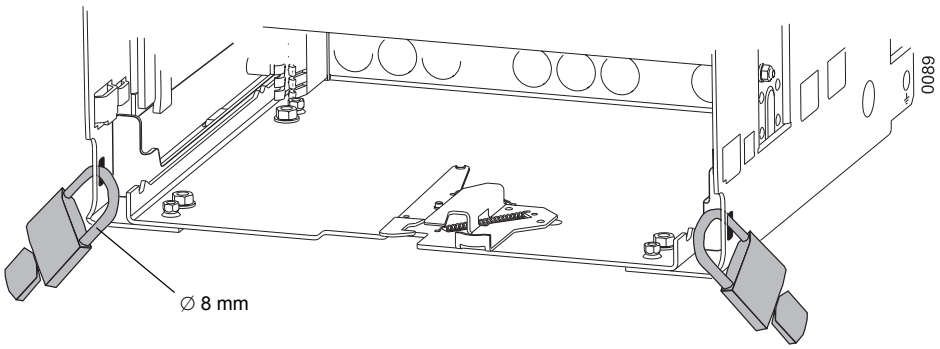


CAUTION
Remove the padlocks at the shutter before moving the circuit-breaker to the connected position!

→ Retrofitting shutters (page 19 – 1)

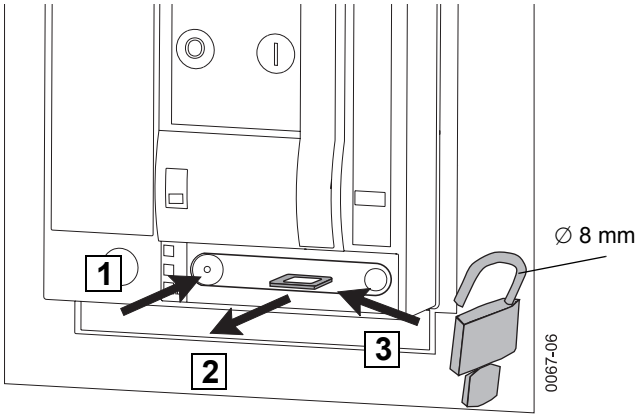
15.2.3 Locking device for guide rails

Available as standard.

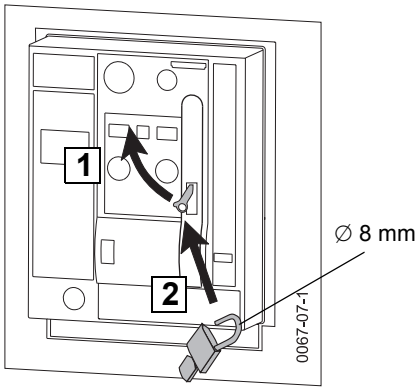


15.2.4 Locking device for racking handle

Available as standard.
Up to 3 padlocks possible.

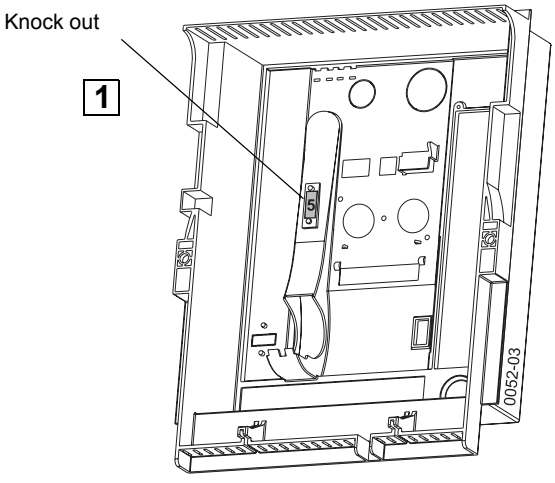


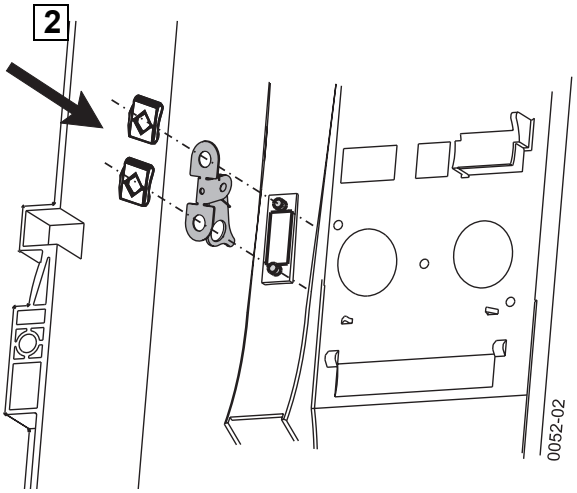
15.2.5 Locking device for spring charging lever



Retrofitting

– Switching off and discharging the spring(→ page 24 – 2)
– Remove front panel (→ page 24 – 6)





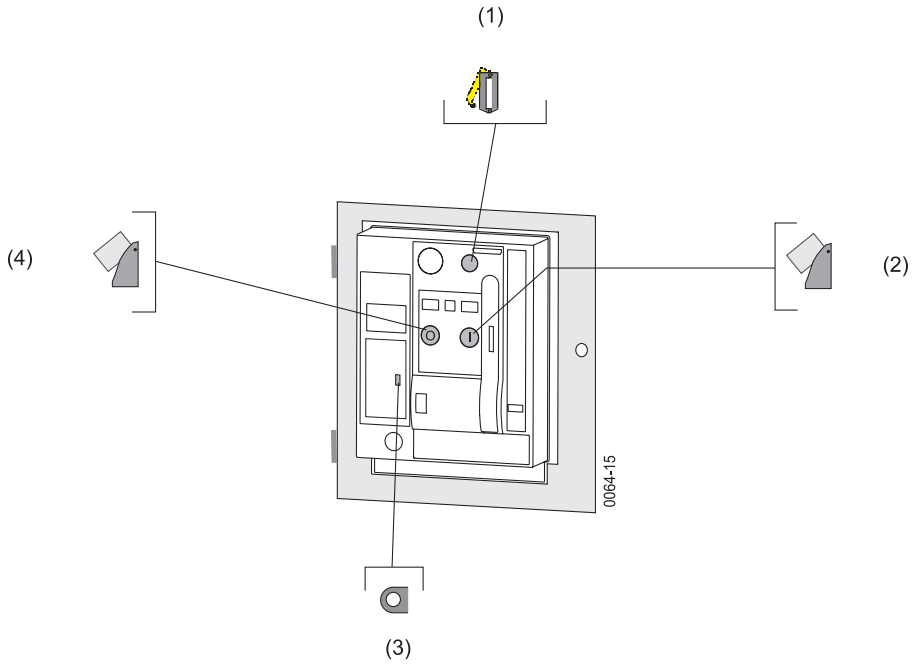
Then:

– Install front panel (→ page 24 – 13)

15.2.6 Locking device for Mechanical OFF/ON button

– (→ page 14 – 2)

16 Sealing fixtures



	Sealing device	Part no.
1	Sealing flap on electrical ON button	(+)IZM-XEE-TP
2	Sealing flap on mechanical ON button	Contained in the IZM-XVD locking set.
3	Overcurrent release without graphic display sealing device	(+)IZM-XHB
	Digital release with graphic display sealing device	(+)IZM-XHBG
4	Sealing flap on mechanical OFF button	Contained in the IZM-XVD locking set.

Sealing cap electrical ON

→ Retrofitting Electrical ON (page 13 – 5)

Sealing cover for Mechanical ON and OFF

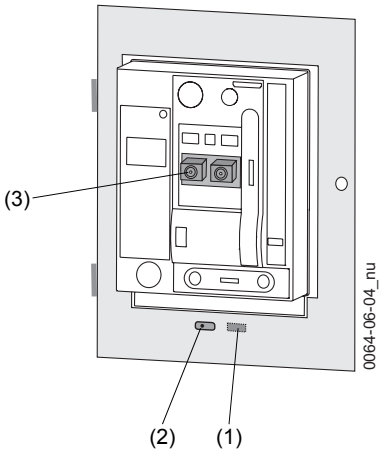
→ Retrofitting sealing cap (page 14 – 2)

Over current release sealing device

→ Sealing and locking equipment (page 9 – 45)

→ Retrofitting locking device for reset button (page 15 – 13)

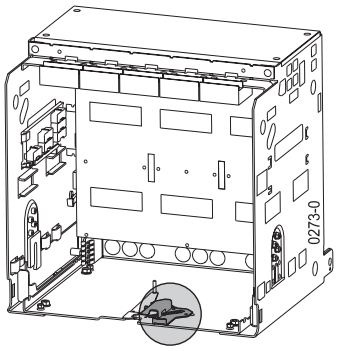
17 Locking devices



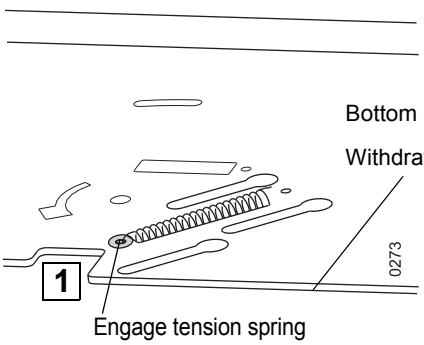
	Locking arrangement	Reaction	Part no.
1	Interlock to prevent motion with an open control panel door for withdrawable circuit-breakers	The racking handle is blocked if the panel door is open and it cannot be drawn out. The circuit-breaker cannot be moved. The interlock acts only on the inserted racking handle. (→ page 17 – 2)	(+)IZM-XVV cannot be combined with (+)IZM-XVK-AV (+)IZM-XV-(R-)AV
2	Panel door interlock	The panel door cannot be opened if the fixed-mounted circuit-breaker is closed (signal transmission through Bowden cables) or if the withdrawable circuit-breaker is in the operating position. (→ page 17 – 2)	(+)IZM-XVT for fixed mounting (+)IZM-XVT-AV for withdrawable units
3	Access block over mechanical ON and OFF button (locking set)	Mechanical ON and OFF buttons are covered with a cap that only allows operation with a tool. (→ page 14 – 2)	Access inhibiter is included in the IZM-XVD interlocking set

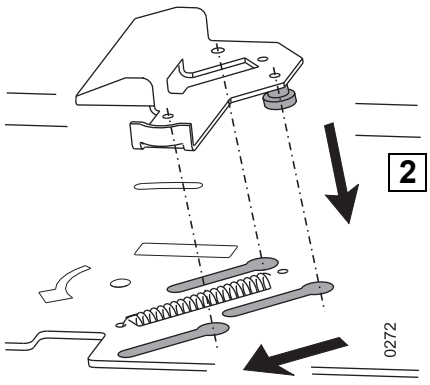
17.1 Locking device to prevent racking with panel door open

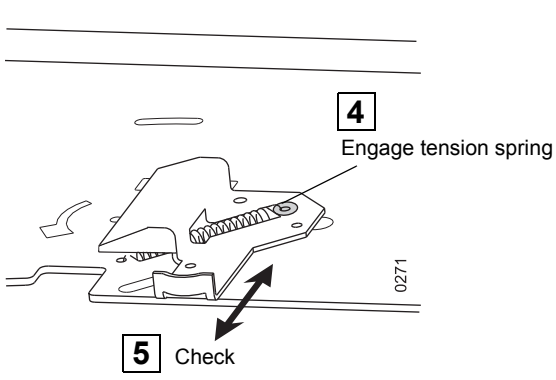
– Switching off and discharging the spring(→ page 24 – 2)
– Remove the circuit-breaker from the withdrawable unit (→ page 24 – 3)



Fitting interlocking





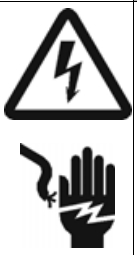


Check function

– Insert the circuit-breaker in the withdrawable unit and push into disconnected position (→ page 6 – 1)
– It must not be possible to draw out the racking handle

The interlock acts only on the inserted racking handle.

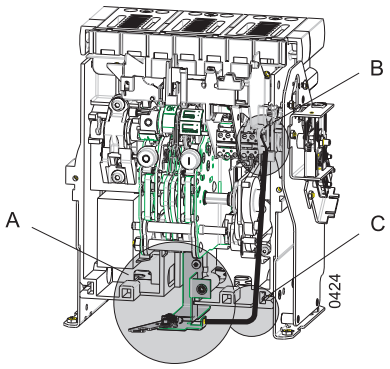
17.2 Panel door interlock

	Danger
	**Dangerous voltage.** **Can cause death or serious personal injury as well as damage to device and equipment.** Before working on the device be sure to switch off the switchboard and earth the device. Switch off circuit-breaker and remove from withdrawable unit.

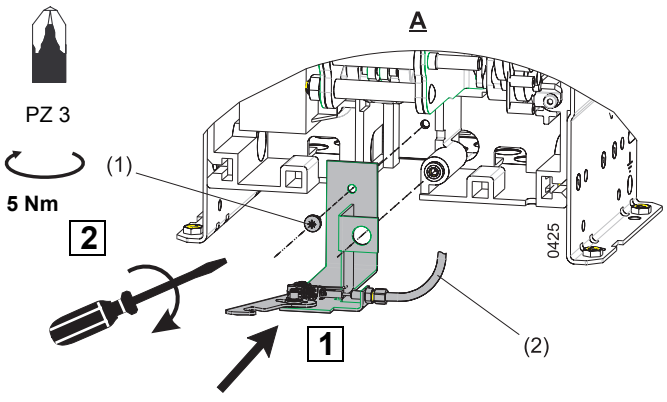
17.2.1 Fit bolt

Fixed-mounted circuit-breaker

– Switching off and discharging the spring (→ page 24 – 2)
– Remove front panel (→ page 24 – 6)

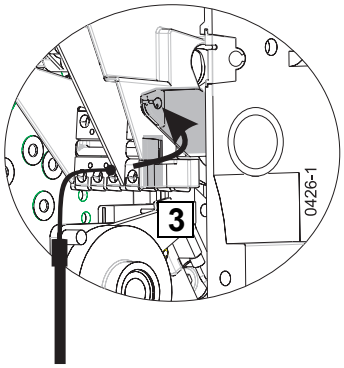


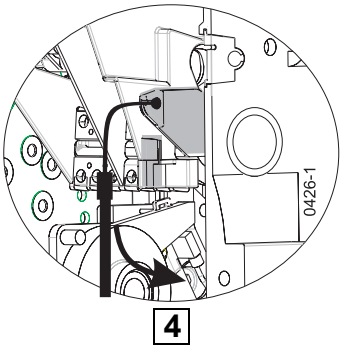
CAUTION
Tighten self-tapping screws carefully!

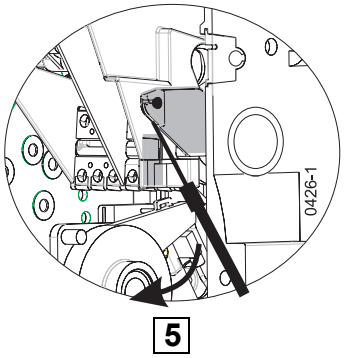


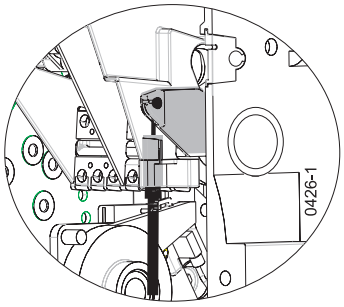
(1) Self-tapping screw
(2) Bowden cables

B

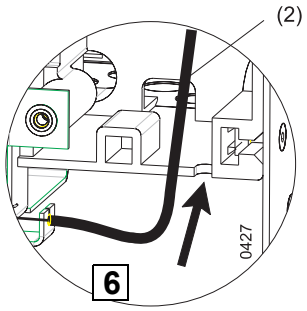


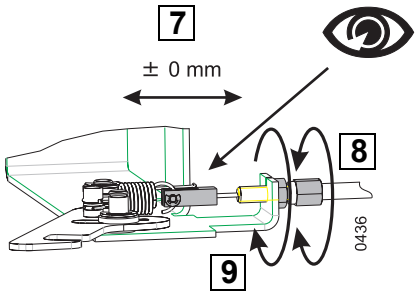




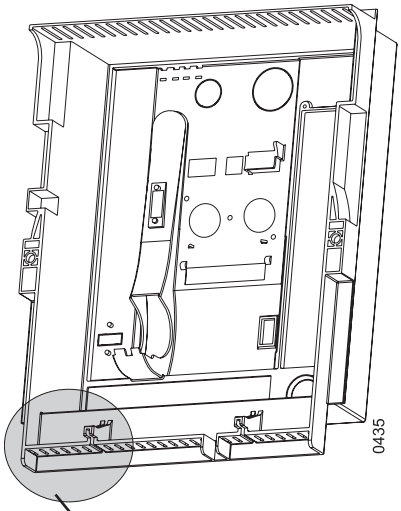


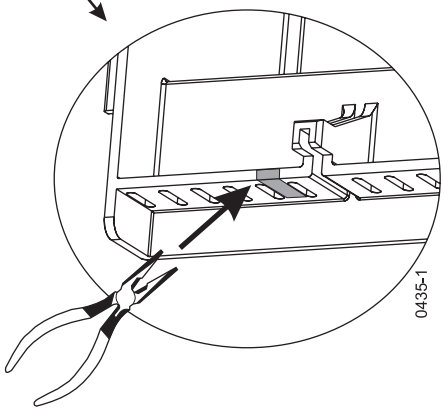
C





Knock out front panel



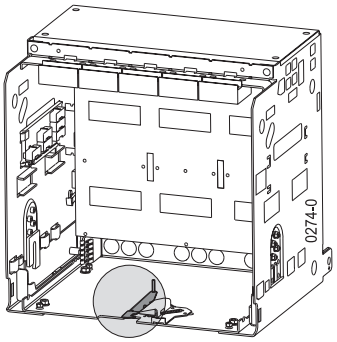


Then:

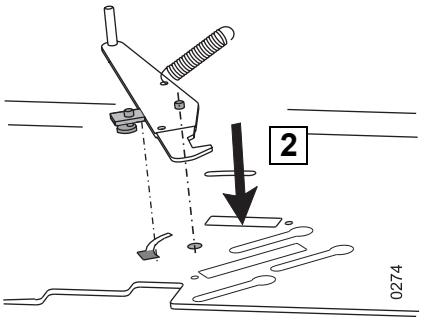
– Install front panel (→ page 24 – 13)

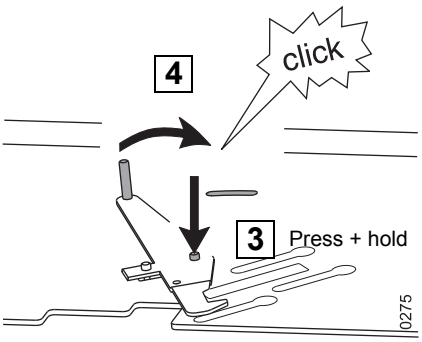
Withdrawable units

– Switching off and discharging the spring (→ page 24 – 2)
– Remove the circuit-breaker from the withdrawable unit (→ page 24 – 3)

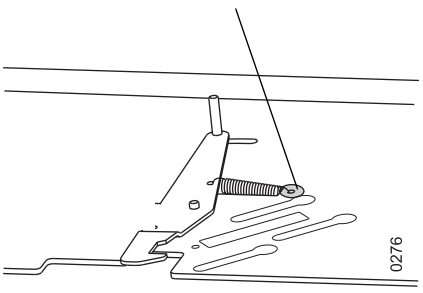


1 Engage tension spring





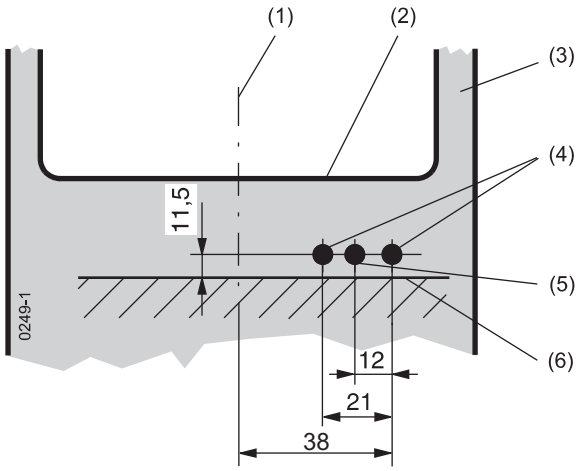
5 Engage tension spring



Then:

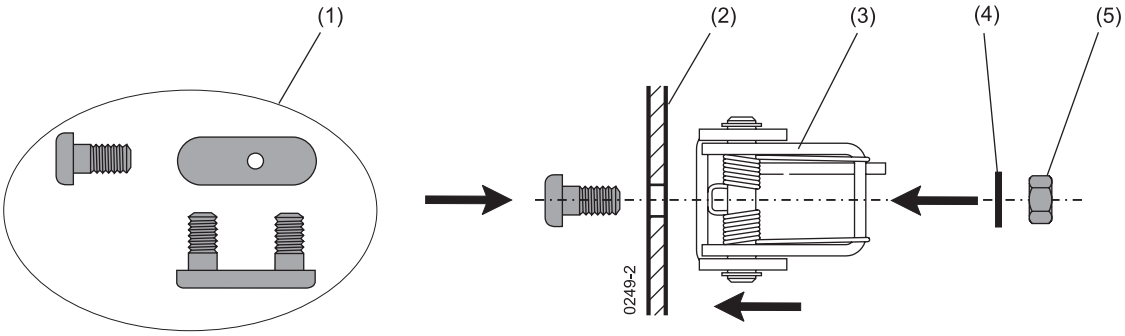
– Place circuit-breaker in the withdrawable unit and slide to disconnected position. (→ page 6 – 1)

17.2.2 Panel door interlock drill pattern



(1) Centre of front panel
(2) Door cutout for front panel
(3) Inside of panel door
(4) 2 mounting holes Ø 5.5 mm
(5) Hole to defeat Ø 5.5 mm
(6) Withdrawable unit installation level

17.2.3 Fitting catch on panel door



(1) Clip with hole to defeat
(2) Inside of panel door
(3) Catch
(4) 2 washers 5.3 (DIN 125)
(5) 2 hexagonal nuts M5 (DIN 934)

17.2.4 Function check

Fixed-mounted circuit-breaker:

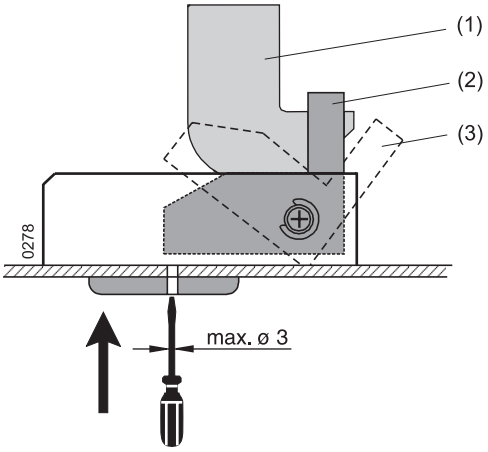
– Close the panel door
– Charging the storage spring
– Switch on

Withdrawable circuit-breaker:

– Rack the circuit-breaker into connected position
– Close the panel door

The door must be locked now.

Check for “defeat” possibility:



(1) Lock position with circuit-breaker closed or if draw-out breaker is in connected position
(2) Trap in normal position
(3) Trap in bypassed position

Then:

– Fixed-mounted circuit-breaker: Discharge the storage spring
(→ page 24 – 2)

17.3 Retrofitting access inhibiter over mechanical ON and OFF button

(Tool operation)

	WARNING
	**Before working on the device be sure to switch off the switchboard and earth the device.**

– (→ page 14 – 2)

18 Mutual mechanical interlocking

The mutual mechanical interlock can be found in use in 2 different versions:

→ **Version 1 up to 04/2007**
→ **Version 2 from 05/2007**

The version decides the use of differing Bowden cable types. This must be considered when the Bowden cable must be replaced in a **Version 1** (Article number
→ page 18 – 15)

With new orders for the interlock **Version 2** is always delivered with the current suitable Bowden cable.

Note

For the functioning of the interlocking certain conditions must apply in the switchboard:

1 The Bowden cable must be layed as straight as possible with as few bends as possible.

2 Bending radius of the Bowden cable > 500 mm.

3 The total bending angle of the Bowden cable must not exceed 540°.

4 For vertical assembly of interlocked circuit-breakers the interlock mechanism should be alligned.

5 Circuit-breakers that are to be interlocked must be so arranged so that the 2 m or 4.5 m long Bowden cables can be optimally laid out so that they fulfil points 1 to 4.

6 The Bowden cable must be fixed (e.g. with cable ties) before the adjustment.

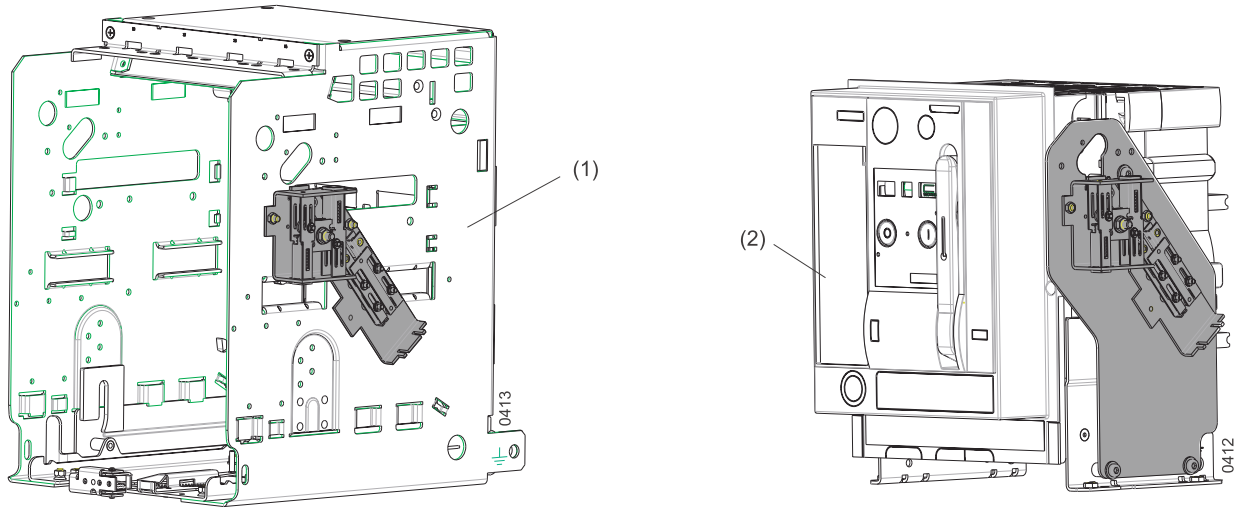
7 The adjustment freedom for the interlocking must be guaranteed by the selection of the panel width.

8 Apertures in parts of the system should be arranged that the Bowden cable run is not inhibited.

The mechanical interlocking in the standard design allows various versions for the mutual interlocking using a maximum of three circuit-breakers. Extensions are possible.

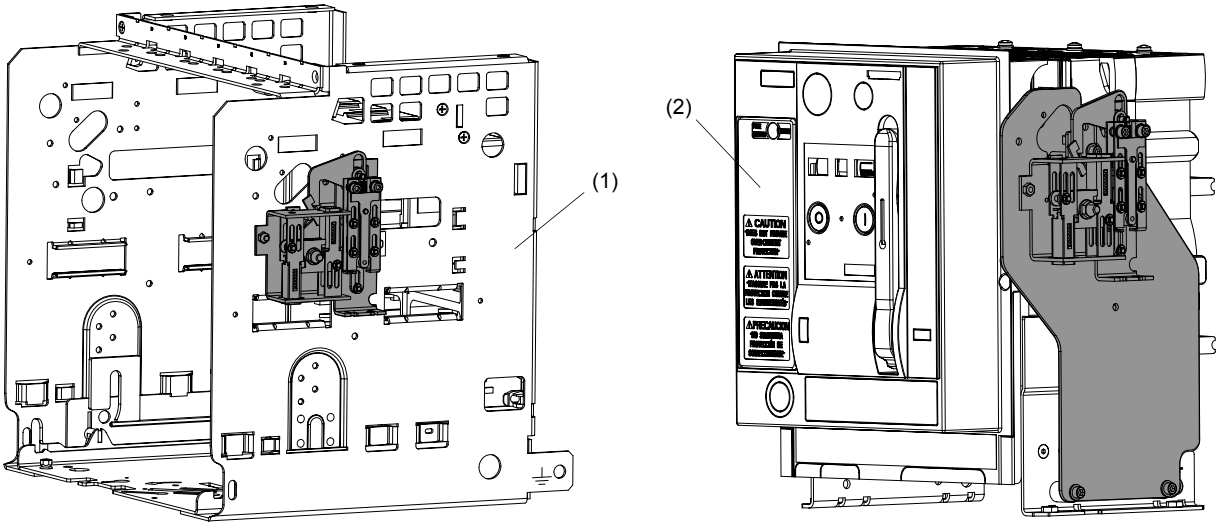
Interlocking module, Version 1

Fixed-mounted and withdrawable units can be combined.



(1) Withdrawable unit
(2) Fixed-mounted circuit-breaker

Interlocking module, Version 2



(1) Withdrawable unit
(2) Fixed-mounted circuit-breaker

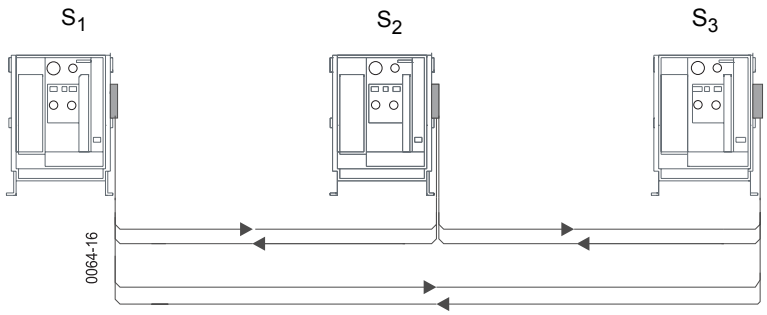
Designation	Part no.
Interlocking set per fixed-mounted circuit-breaker, incl. 2 m Bowden cables (= fig. (2) top)	(+)IZM-XMV
Locking set per withdrawable circuit-breaker, incl. 2 m Bowden cables	(+)IZM-XMV-AV
Adapter set for adaptation of the mechanical interlocking to withdrawable units frame size 3	(+)IZM3-XMVAS-AV
Additional Bowden cable, 2 m [1)]	IZM-XMVB200
Additional Bowden cable, 3 m [1)]	IZM-XMVB300
Additional Bowden cable, 4.5 m [1)]	IZM-XMVB450
Individual components for spare part purposes or separate order of withdrawable unit and circuit-breaker for withdrawable use	
Intermediate shaft with coupling (→ page 18 – 9)	(+)IZM-XMVAD
Locking set for withdrawable unit, incl. 2 m Bowden cables (= fig. (1) top)	IZM-XMVAD-AV

1) Bowden cable for replacement use → (page 18 – 15).

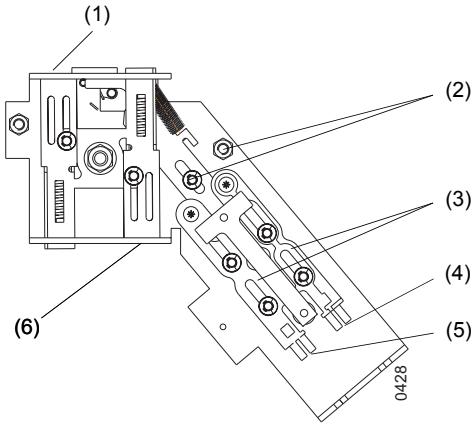
(IZM-XMV-AV) = (IZM-XMVAD) & (IZM-XMVAD-AV)

18.1 Configurations

18.1.1 General notes

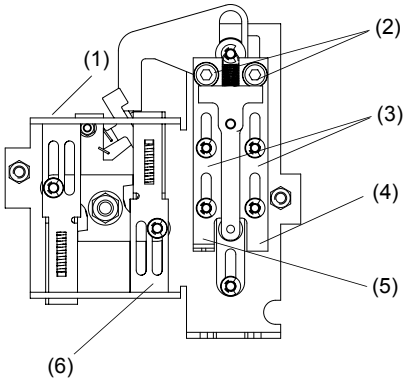


Version 1



(1) Output 1
(2) **Version 1:** Drilling for Plastite screw with toothed lock washer for interlock configuration
Version 2: Drilling with fixed nut for M6 cheese-headed screw with washer for interlock configuration.
(3) Index brackets
(4) Input 1
(5) Input 2
(6) Output 2

Version 2

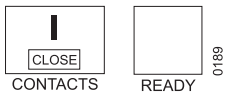
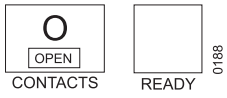
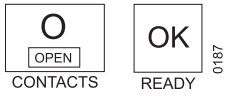


In the following configuration instructions, the following designations apply:

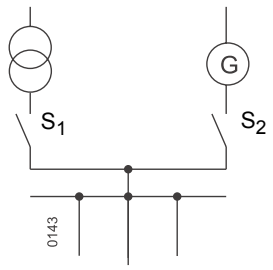
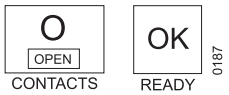
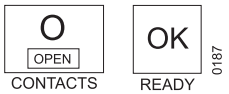
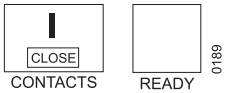
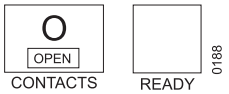
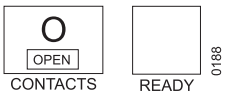
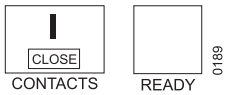
A_1: Output information 1
E_1: Input information 1
S_1: Circuit-breaker 1

For example, in order to couple the output information 1 of the circuit-breaker 1 with the input information 2 of the circuit-breaker 2 the abbreviation $S_1\ A_1$ - $S_2\ E_2$ is used.

The states of the circuit-breaker are shown on operating panel:

	Circuit-breaker closed
	Circuit-breaker open and not ready to close (interlocked)
	Circuit-breaker open and ready to close (not interlocked)

18.1.2 Two circuit-breakers against each other

<table>
<tr><th>Example</th><th colspan="2">Possible circuit-breaker states</th></tr>
<tr><td rowspan="4"> 
</td><td>S1</td><td>S2</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td> 
</td><td> 
</td></tr>
</table>

Description:

A circuit-breaker can be closed only if the other is open.

Materials required:

Each circuit-breaker has an interlocking module and a Bowden cable.

Connections of Bowden cables:

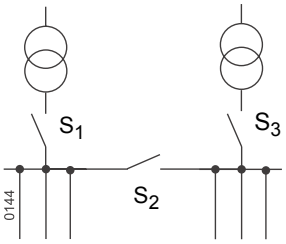
1st Bowden cable:	S1 A_1 –	S2 E_1
2nd Bowden cable:	S2 A_1 –	S1 E_1

Note:

S_x E_x

At these connections, the cheese-head screws must be screwed into the index brackets with strain washers.

18.1.3 Three circuit-breakers among each other

Example	Possible circuit-breaker states		
	S1	**S2**	**S3**
	O OPEN CONTACTS OK READY 0187	O OPEN CONTACTS OK READY 0187	O OPEN CONTACTS OK READY 0187
	I CLOSE CONTACTS READY 0189	O OPEN CONTACTS OK READY 0187	O OPEN CONTACTS OK READY 0187
	O OPEN CONTACTS OK READY 0187	I CLOSE CONTACTS READY 0189	O OPEN CONTACTS OK READY 0187
	O OPEN CONTACTS OK READY 0187	O OPEN CONTACTS OK READY 0187	I CLOSE CONTACTS READY 0189
	I CLOSE CONTACTS READY 0189	I CLOSE CONTACTS READY 0189	O OPEN CONTACTS READY 0188
	O OPEN CONTACTS READY 0188	I CLOSE CONTACTS READY 0189	I CLOSE CONTACTS READY 0189
	I CLOSE CONTACTS READY 0189	O OPEN CONTACTS READY 0188	I CLOSE CONTACTS READY 0189

Description:

Any two circuit-breakers can be closed, with the third being interlocked.

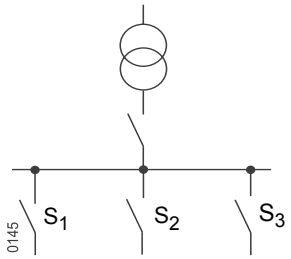
Materials required:

Each circuit-breaker has an interlocking module and a Bowden cable. Three additional Bowden cables must be ordered separately.

Connections of Bowden cables:

1st Bowden cable:	S1 A_1	–	S2 E_1
2nd Bowden cable:	S1 A_2	–	S3 E_1
3rd Bowden cable:	S2 A_1	–	S1 E_1
4th Bowden cable:	S2 A_2	–	S3 E_2
5nd Bowden cable:	S3 A_1	–	S1 E_2
6nd Bowden cable:	S3 A_2	–	S2 E_2

18.1.4 Three circuit-breakers among each other

Example	Possible circuit-breaker states		
	S1	**S2**	**S3**
	O OPEN CONTACTS OK READY 0187	O OPEN CONTACTS OK READY 0187	O OPEN CONTACTS OK READY 0187
	I CLOSE CONTACTS READY 0189	O OPEN CONTACTS READY 0188	O OPEN CONTACTS READY 0188
	O OPEN CONTACTS READY 0188	I CLOSE CONTACTS READY 0189	O OPEN CONTACTS READY 0188
	O OPEN CONTACTS READY 0188	O OPEN CONTACTS READY 0188	I CLOSE CONTACTS READY 0189

Description:

At these connections, the cheese-head screws must be screwed into the non-interchangeable brackets with strain washers.

Materials required:

Each circuit-breaker has an interlocking module and a Bowden cable. Three additional Bowden cables must be ordered separately.

Connections of Bowden cables:

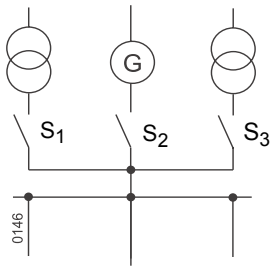
1st Bowden cable:	S1 A_1 –	S2 E_1
2nd Bowden cable:	S1 A_2 –	S3 E_1
3rd Bowden cable:	S2 A_1 –	S1 E_1
4th Bowden cable:	S2 A_2 –	S3 E_2
5nd Bowden cable:	S3 A_1 –	S1 E_2
6nd Bowden cable:	S3 A_2 –	S2 E_2

Note:

S_x E_x

At these connections, the cheese-head screws must be screwed into the index brackets with strain washers.

18.1.5 Three circuit-breakers against each other

Example	Possible circuit-breaker states		
	S1	**S2**	**S3**
	O OPEN CONTACTS OK READY 0187	O OPEN CONTACTS OK READY 0187	O OPEN CONTACTS OK READY 0187
	I CLOSE CONTACTS READY 0189	O OPEN CONTACTS READY 0188	O OPEN CONTACTS OK READY 0187
	O OPEN CONTACTS OK READY 0187	O OPEN CONTACTS READY 0188	I CLOSE CONTACTS READY 0189
	I CLOSE CONTACTS READY 0189	O OPEN CONTACTS READY 0188	I CLOSE CONTACTS READY 0189
	O OPEN CONTACTS READY 0188	I CLOSE CONTACTS READY 0189	O OPEN CONTACTS READY 0188

Description:

Two circuit-breakers (S1, S3) can be independently opened and closed, the third (S_2) being ready to close only if the other two are open. If the third is closed, the other two cannot be closed.

Materials required:

Each circuit-breaker has an interlocking module and a Bowden cable. A Bowden cable must be ordered separately.

Connections of Bowden cables:

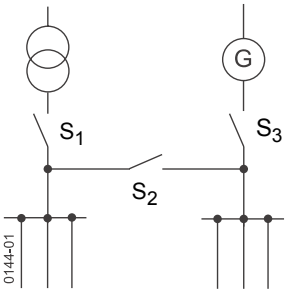
1st Bowden cable:	S1 A_1	–	S2 E_1
2nd Bowden cable:	S2 A_1	–	S1 E_1
3rd Bowden cable:	S2 A_2	–	S3 E_1
4th Bowden cable:	S3 A_1	–	S2 E_2

Note:

S_x E_x

At these connections, the cheese-head screws must be screwed into the index brackets with strain washers.

18.1.6 Three circuit-breakers, two of them against each other

Example	Possible circuit-breaker states		
	S1	**S2**	**S3**
	O OPEN CONTACTS — OK READY 0187	O OPEN CONTACTS — OK READY 0187	O OPEN CONTACTS — OK READY 0187
	O OPEN CONTACTS — OK READY 0187	I CLOSE CONTACTS — READY 0189	O OPEN CONTACTS — READY 0188
	O OPEN CONTACTS — OK READY 0187	O OPEN CONTACTS — READY 0188	I CLOSE CONTACTS — READY 0189
	I CLOSE CONTACTS — READY 0189	O OPEN CONTACTS — OK READY 0187	O OPEN CONTACTS — OK READY 0187
	I CLOSE CONTACTS — READY 0189	I CLOSE CONTACTS — READY 0189	O OPEN CONTACTS — READY 0188
	I CLOSE CONTACTS — READY 0189	O OPEN CONTACTS — READY 0188	I CLOSE CONTACTS — READY 0189

Description:

One circuit-breaker (S_1) can be opened and closed independently of the two others. The two others cancel each other out, i.e. one can only be closed if the other is open.

Materials required:

Two of the three circuit-breakers (S_2, S_3) each have an interlocking module and a Bowden cable.

Connections of Bowden cables:

1st Bowden cable:	S2 A_1 –	S3 E_1
2nd Bowden cable:	S3 A_1 –	S2 E_1

Note:

S_x E_x

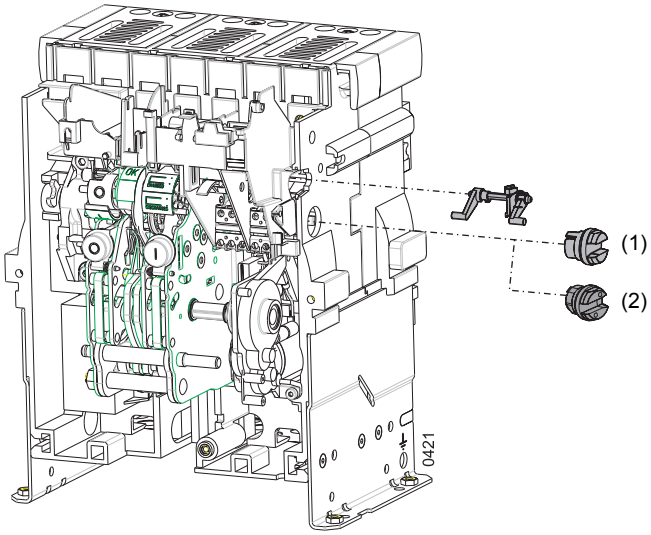
At these connections, the cheese-head screws must be screwed into the index brackets with strain washers.

18.2 Retrofitting interlocking module

	WARNING
	**Before working on the device be sure to switch off the switchboard and earth the device.**

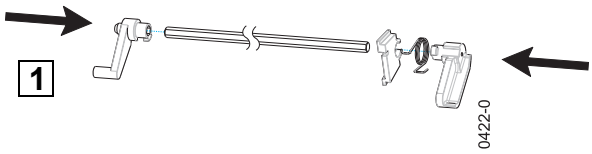
– Switching off and discharging the spring(→ page 24 – 2)
– Remove the circuit-breaker from the withdrawable unit (→ page 24 – 3) or remove the fixed-mounted circuit-breaker if necessary (→ page 5 – 1)
– Remove front panel and right side cover, if required (→ page 24 – 6)

18.2.1 Installing intermediate shaft and coupling



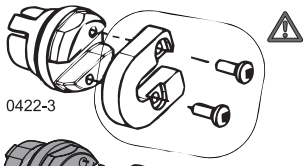
(1) **Interlocking module, Version 1**
(2) **Interlocking module with ring, Version 2**

Fitting

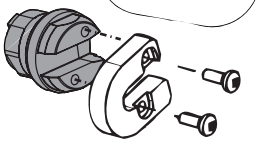


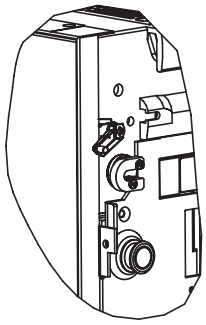
Frame size	Length L (mm)
IZM(IN).1-...	48
IZM(IN).2-...	118
IZM(IN).3-...	232

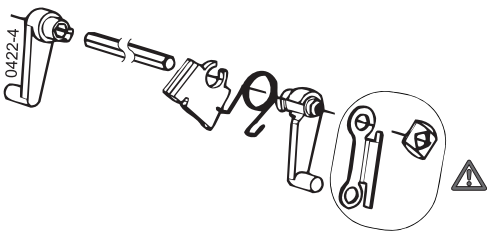
Interlocking module, Version 1



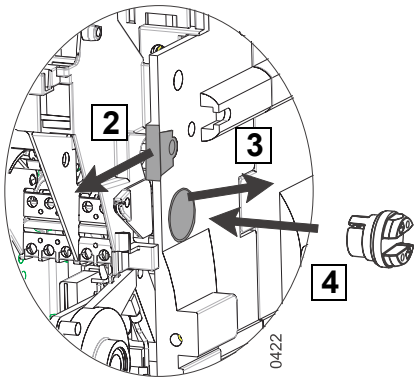
Interlocking module with ring, Version 2

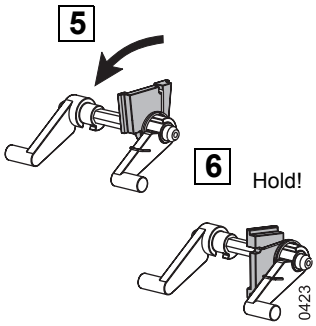


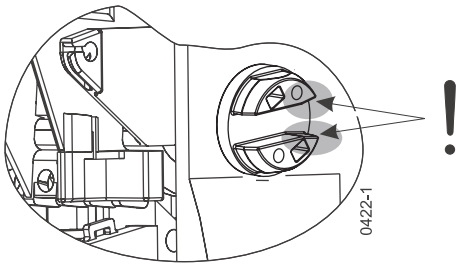


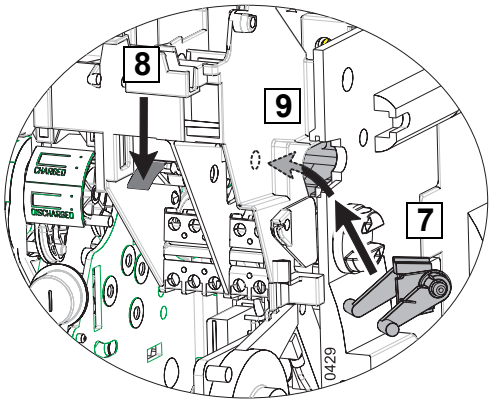


	Additional adapter devices have to be mounted for withdrawable units frame size 3 (IZM(IN).3-... + IZM-XAV...) only. (Also order adapter set (+)IZM3-XMVAS-AV!)



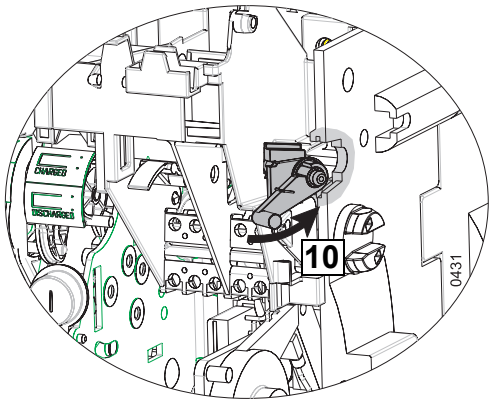


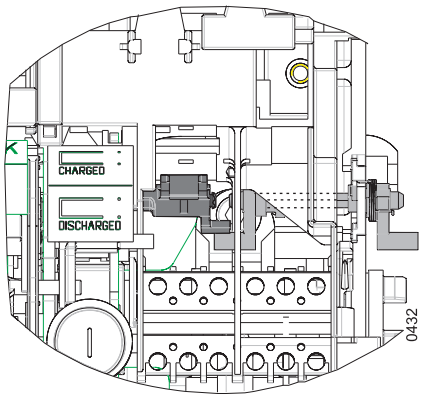




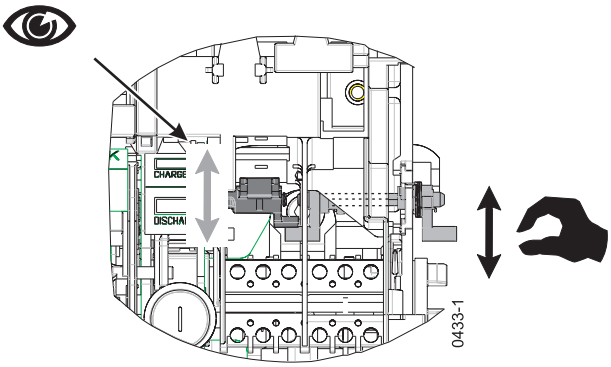
Note

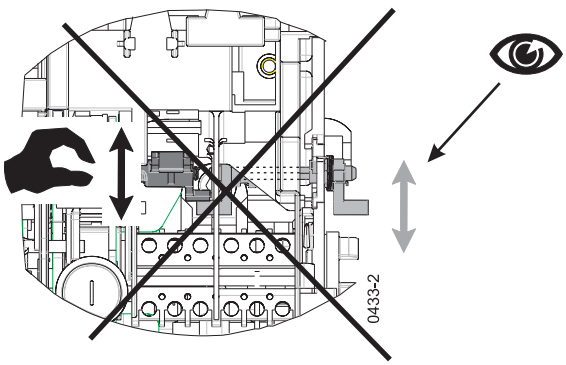
In working step **9**, the intermediate shaft must engage in a hole inside the circuit-breaker.
Only then it will be possible – in working step **10** – to fit the support for the intermediate shaft in the guide of the side wall.





Function check





Then:

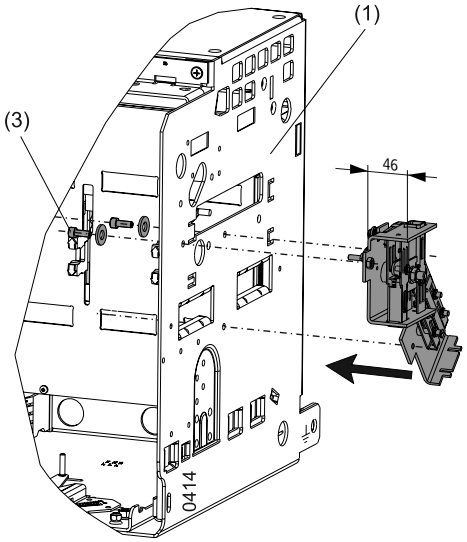
– Fit back front panel and right side cover, if it was removed
(→ page 24 – 13)

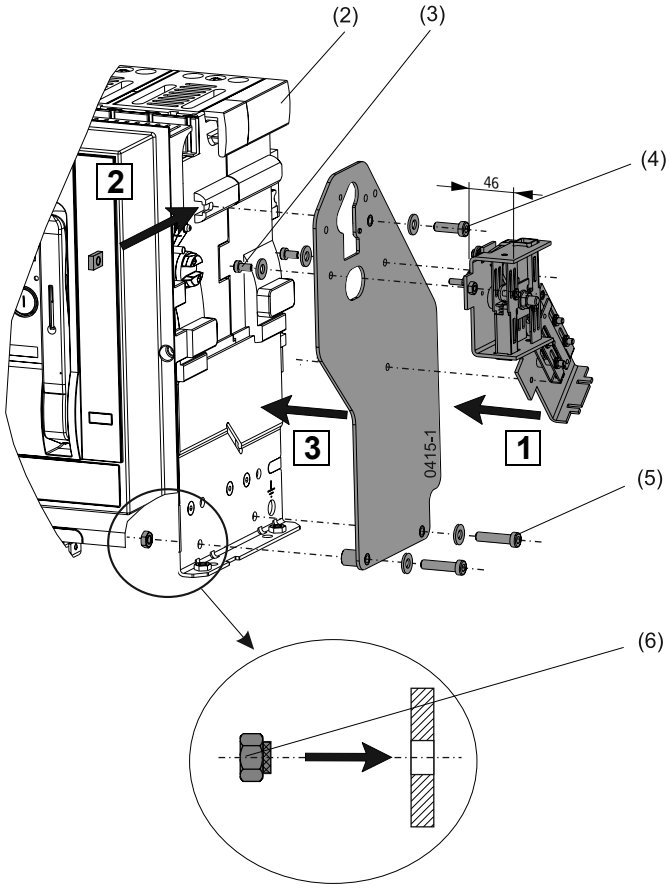
18.2.2 Installing interlocking module

Note

If there isn't enough free space for installation on the right side of the circuit-breaker inside the cubicle, it may be advantageous to pre-assemble the Bowden cables on the outgoing side before fitting the interlocking module. (→ page 18 – 13)

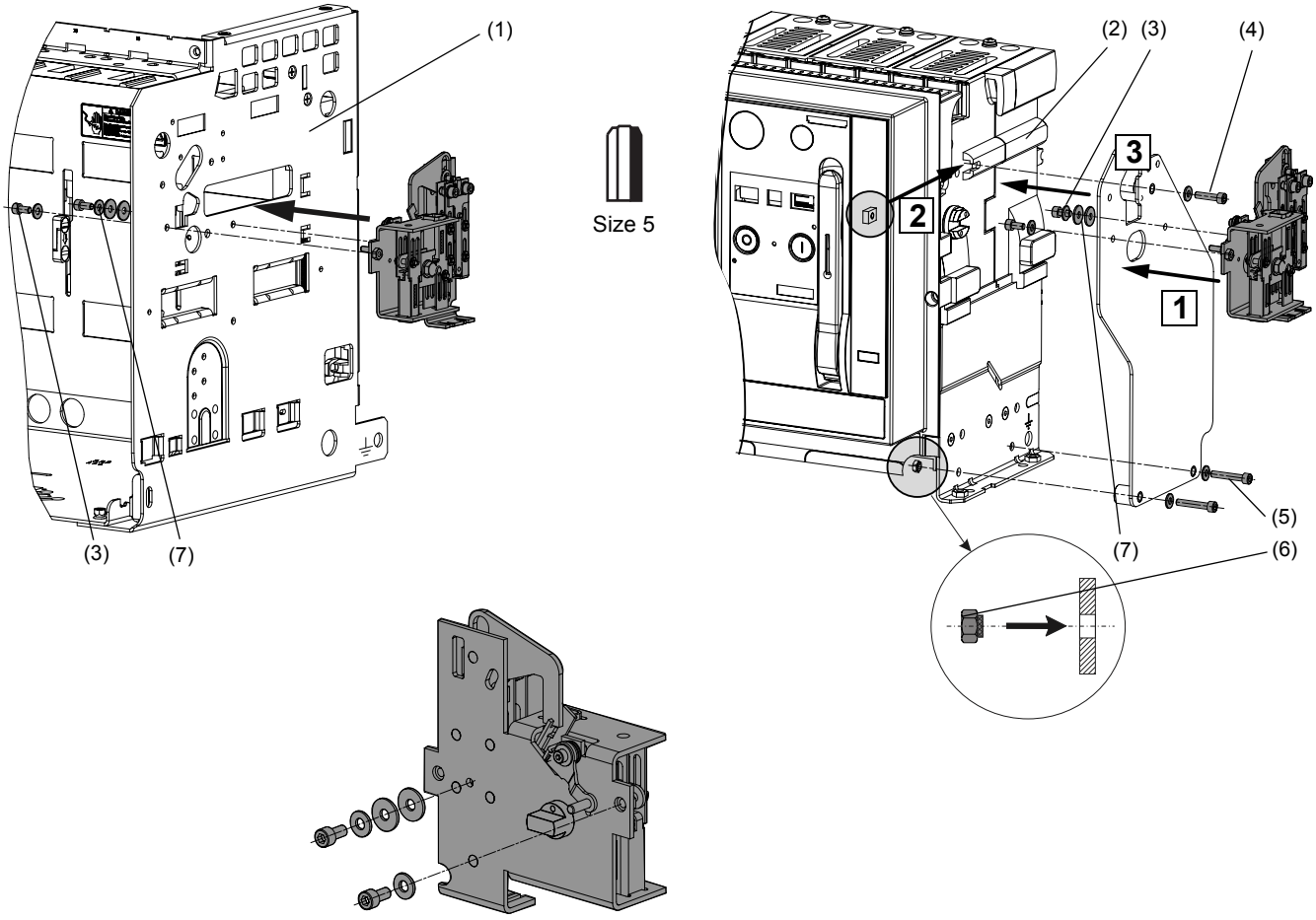
Interlocking module, Version 1





(1) Withdrawable unit
(2) Fixed-mounted circuit-breaker
(3) 3x hexagon socket bolt M6x12 with strain washer
(4) 1x Allen screw M6x20 with strain washer and square nut
(5) 2x hexagon socket bolt M6x30 with strain washer
(6) 2x press nut; penetrates into mounting foot by tightening; if necessary, prevent press nut from rotating

Interlocking module, Version 2



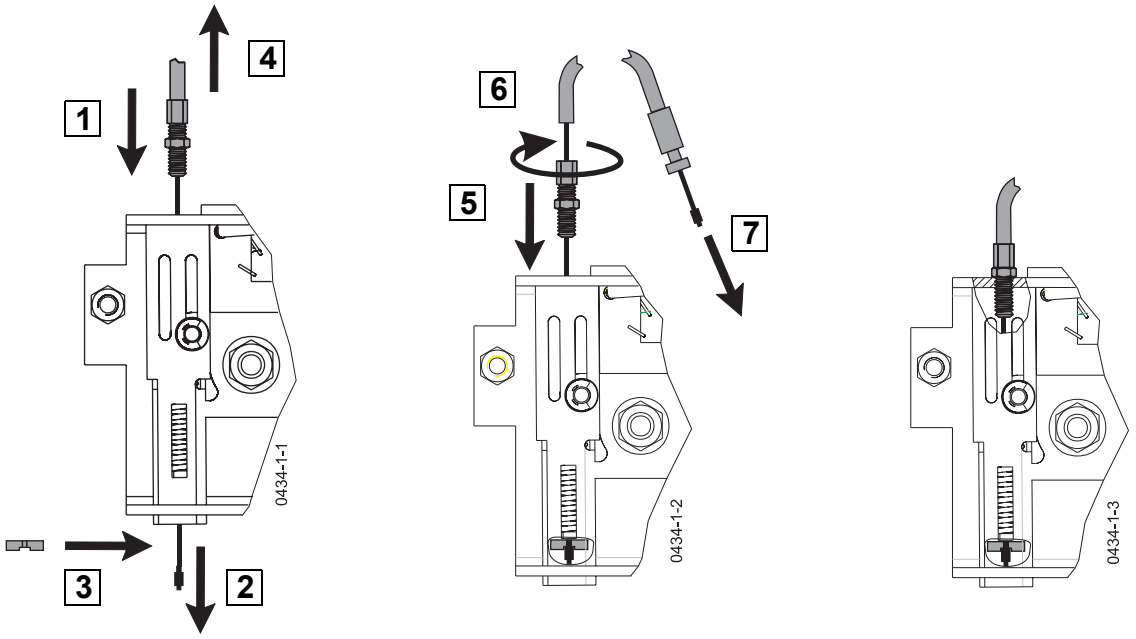
(1) Withdrawable unit
(2) Fixed-mounted circuit-breaker
(3) 2x Allen screw M6x12 with strain washer
(4) 1x Allen screw M6x25 with strain washer and square nut
(5) 2x hexagon socket bolt M6x35 with strain washer
(6) 2x press nut; penetrates into mounting foot by tightening; if necessary, prevent press nut from rotating
(7) 2x washers with large external diameter

Then:

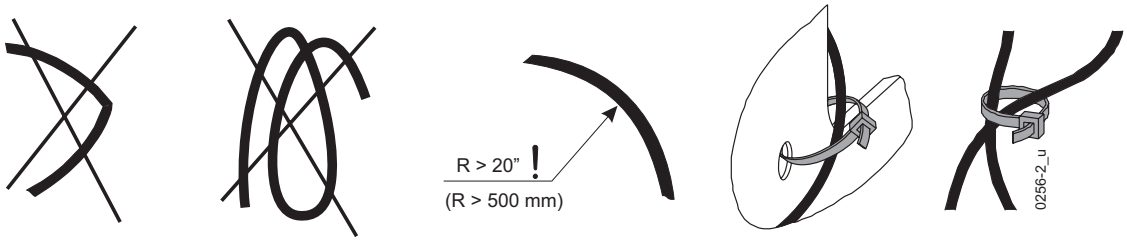
– Re-install the fixed circuit-breaker (→ page 5 – 1)

18.2.3 Mounting the Bowden cables

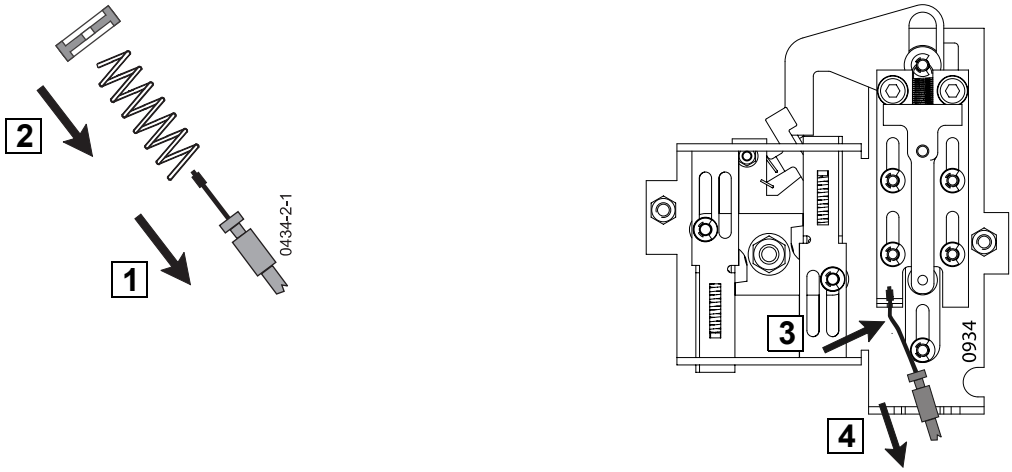
Fitting Bowden cables on output site

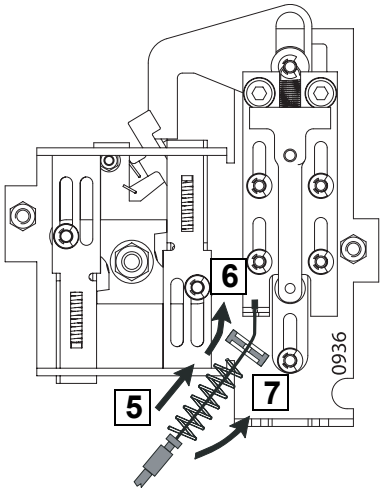


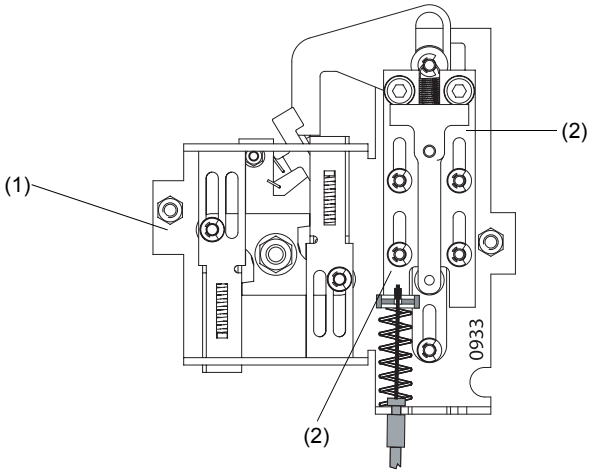
Fix the Bowden cables



Installing the Bowden cables at the entrance of the circuit-breaker to be interlocked

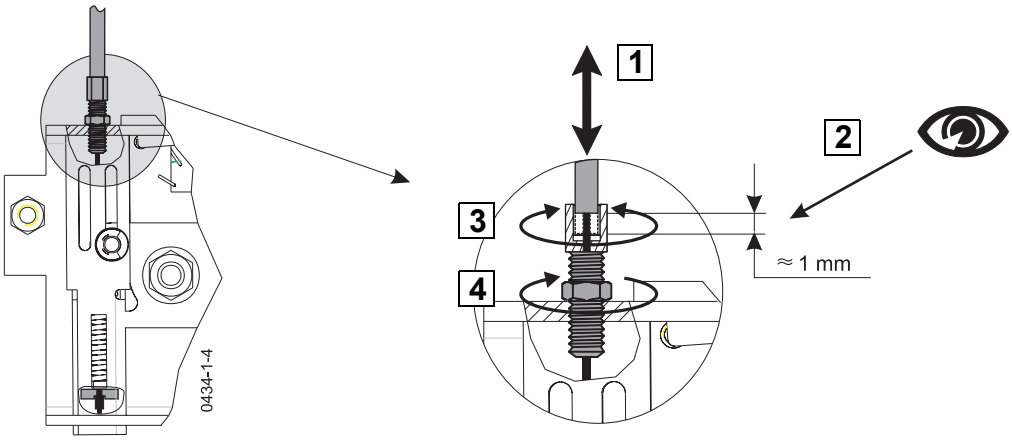






(1) Version with steel Index bracket
(2) Index brackets

Adjusting the Bowden cables



Then:

– According to the planned configuration of the circuit-breaker interlocking, screw cheese-head bolts with strain washers into the associated index brackets if applicable → Configurations (page 18 – 3).
– Insert the withdrawable circuit-breaker, push into disconnected position, close the cubicle door if necessary and rack into connected position (→ page 6 – 1).

18.2.4 Function test

– Close the cubicle doors
– Charge spring of circuit-breakers to be interlocked (→ page 6 – 4)
– Test the various possibilities of the planned interlocking configuration one after the other
– Re-adjust Bowden cables if necessary

Then:

– Discharge spring of the circuit-breakers to be interlocked (→ page 24 – 2)

Note

Observe the following maintenance instructions:

1 Check the Bowden cable setting after the first 100 operations and readjust if necessary!

2 Check the setting again after another 1000 operations or min one year and readjust if necessary!

3 The Bowden cables should be also checked for kinks and wear, damaged wires, damage to the sleeving and adjustment unit (sleeving with adjustment thread and nut) and if necessary exchanged.

4 With increased environmental conditions, e.g. increased ambient temperature or increased pollution potential this maintenance cycle must be correspondingly shortened.

5 At contact service and at the latest when the maximum permissible electrical operations of the appropriate frame size the wear parts of the interlock should be changed, → Table, page 18 – 15.

Mutual mechanical interlocking		**Part no.**
for drawer packet[1)]		(+)IZM-XMV-AV
for drawer area[1)]		IZM-XMVAD-AV
for withdrawable circuit-breaker		(+)IZM-XMVAD
For fixed-mounted circuit-breaker[1)]		(+)IZM-XMV
Wearing parts of interlock		
1 Bowden cable 2000 mm (M5)[2)]	for interlock module **Version 1**	IZM-XMVB200-06
1 Bowden cable 3000 mm (M5)[2)]		IZM-XMVB300-06
1 Bowden cable 4500 mm (M5)[2)]		IZM-XMVB450-06
1 Bowden cable 2000 mm (M8x1)	for interlock module **Version 2**	IZM-XMVB200
1 Bowden cable 3000 mm (M8x1)		IZM-XMVB300
1 Bowden cable 4500 mm (M8x1)		IZM-XMVB450
1 Coupling on circuit-breaker (with Ring)		IZM-XMVK
If a Version 1 and a Version 2 interlock module must be connected with each other the appropriate Bowden cable (→ part no.) must be used.		

1) With Bowden cable 2000 mm.
2) Up to 04/2007.

19 Accessories for withdrawable unit

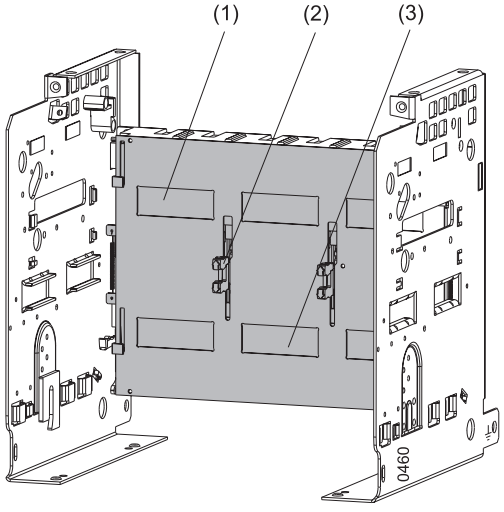
	Designation	Frame size	Part no.
19.1	Shutters (Protection against direct contact)	IZM(IN).1-... IZM(IN).2-... IZM(IN).3-... IZM(IN).1-4-... IZM(IN).2-4-... IZM(IN).3-4-...	(+)IZM1-XIKL (+)IZM2-XIKL (+)IZM3-XIKL (+)IZM1-XIKL4 (+)IZM2-XIKL4 (+)IZM3-XIKL4
19.2	Coding between circuit-breaker and withdrawable unit		
19.2.1	Rated current dependant coding	–	Standard
19.2.2	Version dependant coding	–	IZM-XCE
19.3	Position signalling switches for withdrawable unit	Module 1 Module 2	(+)IZM-XHIAV1 (+)IZM-XHIAV2

19.1 Shutters

The shutter locking straps lock the laminated contacts of the withdrawable unit as soon as the circuit-breaker is taken out, thus fulfilling a shock protection function.

The locking straps can be lifted manually with the strap lifters.

The strap lifters can be fixed in several positions by means of padlocks and secured against unauthorized changes.
(→ page 15 – 16)



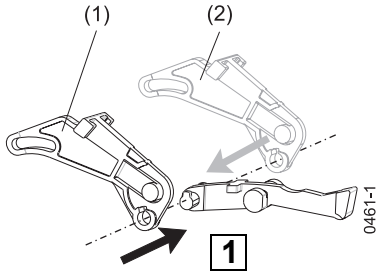
(1) Upper locking strap
(2) 4 Strap lifters
(3) Lower locking strap

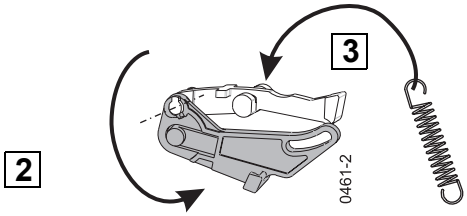
19.1.1 Retrofitting

	WARNING
	**Before working on the device be sure to switch off the switchboard and earth the device.**

– Switching off and discharging the spring(→ page 24 – 2)
– Remove the circuit-breaker from the withdrawable unit (→ page 24 – 3)

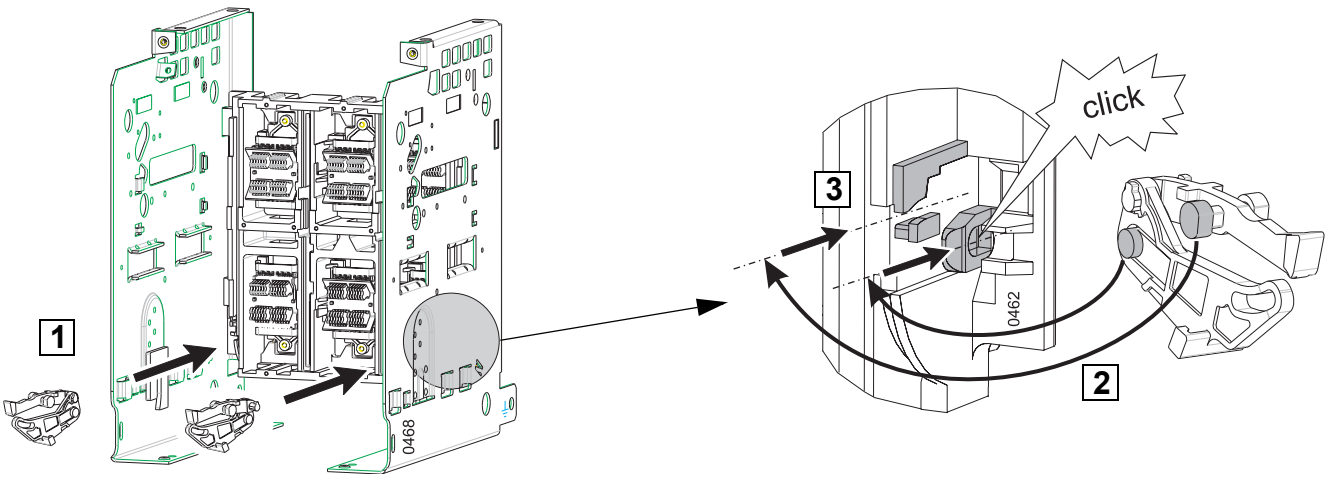
Assembling actuator and completing with spring





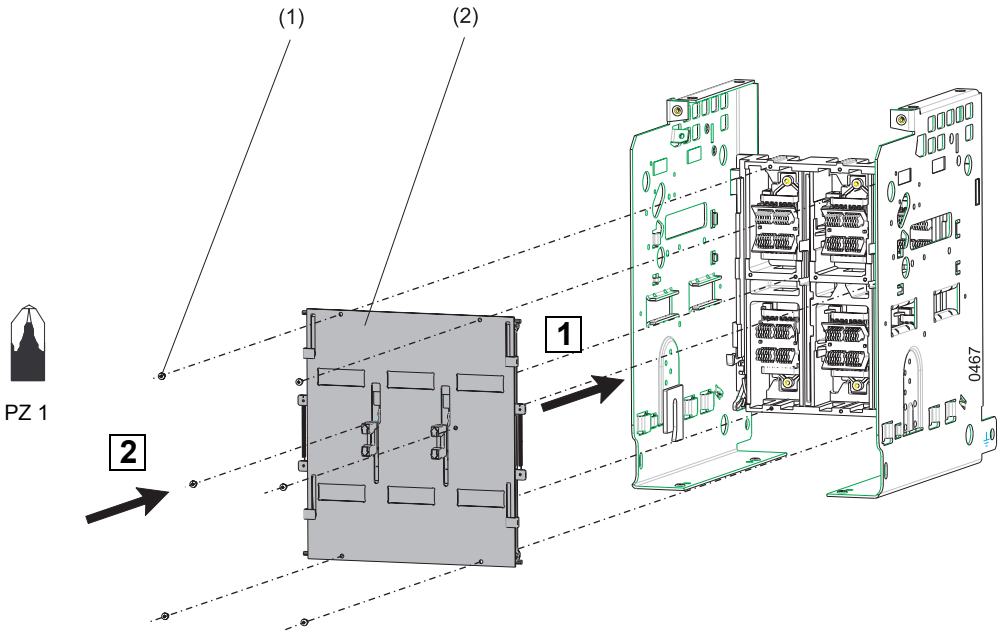
(1) Assembly for right side
(2) Assembly for left side

Inserting actuator



Fitting shutter

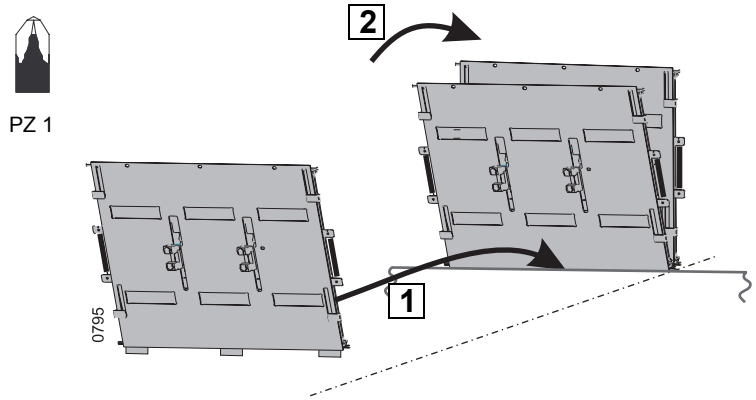
CAUTION
Tighten self-tapping screws carefully!



(1) Self-tapping screws (Number dependant upon circuit-breaker version)

(2) Shutter with strap lifters and locking straps

Only for IZM(IN).3-...

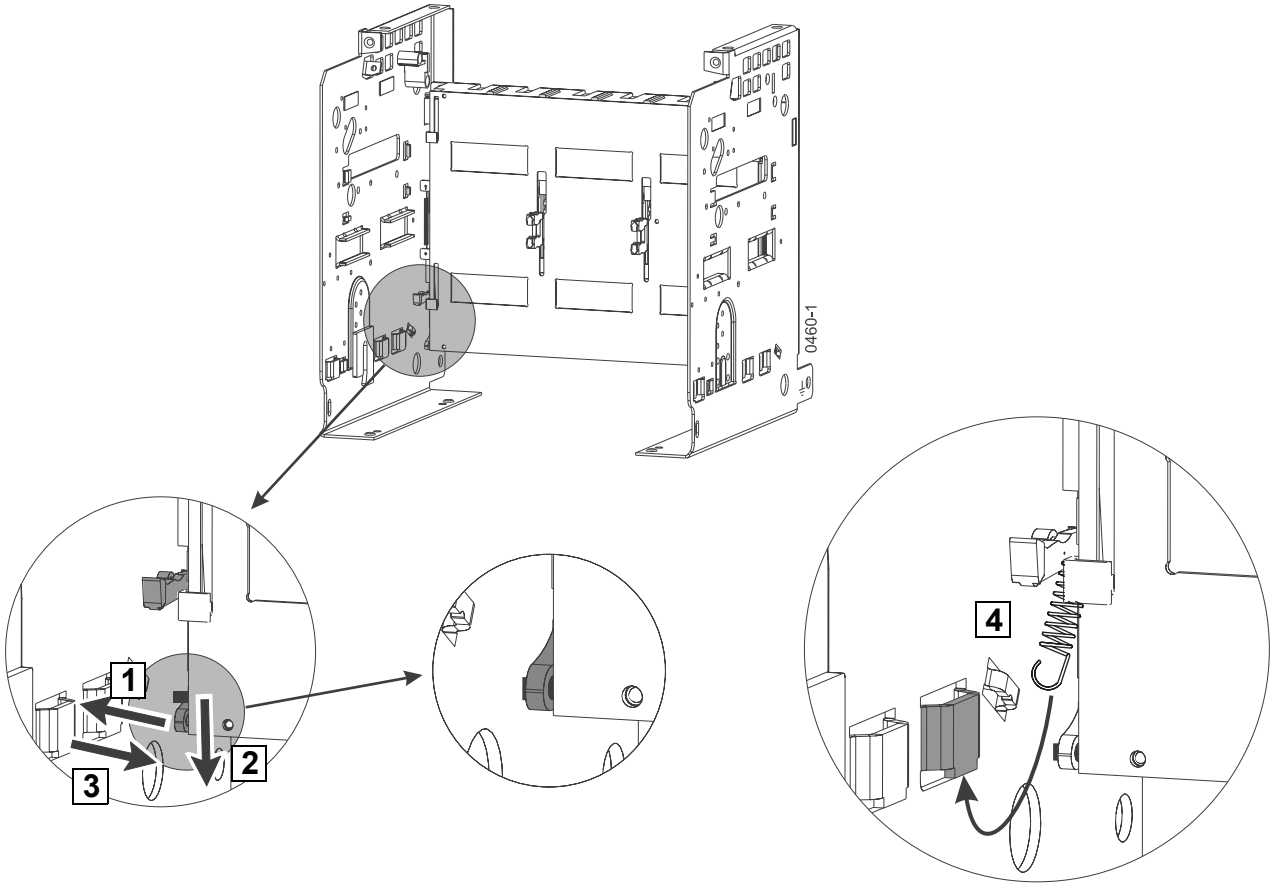


1 Set the shutter at an angle in the slot of the bottom cross-fixing
2 Push the shutter back to the back plate and fix at the top with 3 screws.

Note

For the next step – latching the shutter in the actuator – it may be advantageous to fit the lower screws after latching.

Latching shutter in actuator and fitting spring



Note

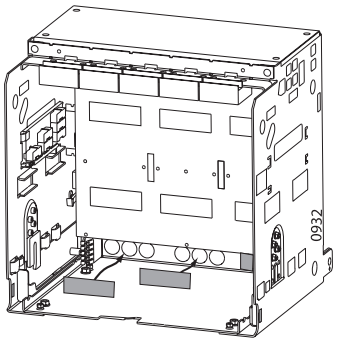
Assure proper operation
by moving each locking strap independently.

Then:

– Insert the circuit-breaker in the withdrawable unit and rack into connected position (→ page 6 – 1)

Close access holes

Access holes for the front connection of mains conductors can be covered with suitable adhesive pads.

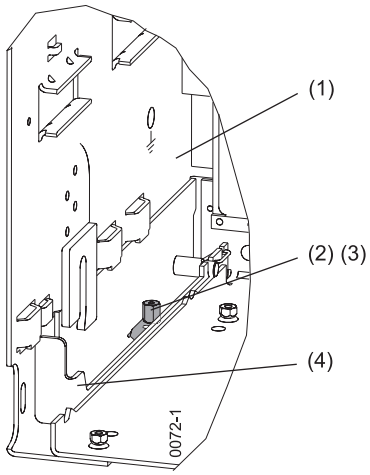


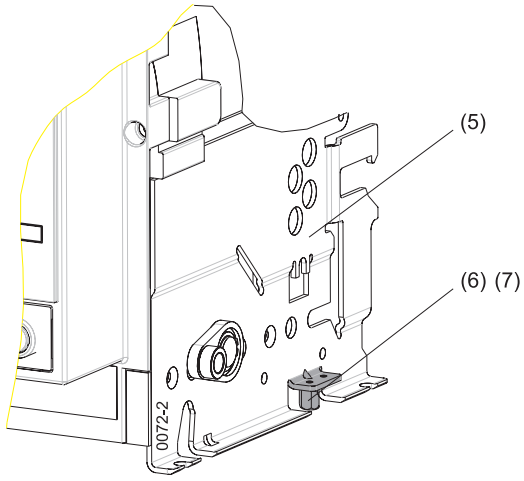
19.2 Coding circuit-breaker - withdrawable unit

19.2.1 Rated current coding

Circuit-breakers and withdrawable units are equipped with a current coding as standard.

This coding ensures that only those circuit-breakers can be inserted in the withdrawable unit whose contact blades fit into the laminated contacts of the withdrawable unit.



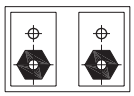
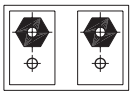
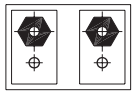
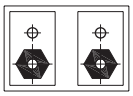
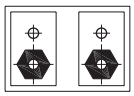
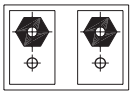
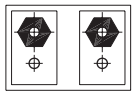
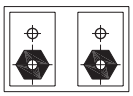
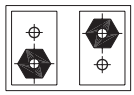
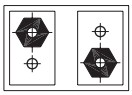
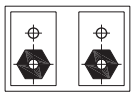
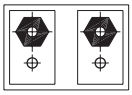
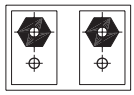
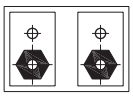
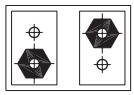
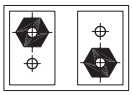


(1) Withdrawable unit, left inner side; right inner side analog
(2) Coding bolts on the guide rails in the withdrawable unit
(3) Self-tapping screw M5x12
(4) Guide rail
(5) Withdrawable circuit-breaker, right side; left side analog
(6) Coding bolt on the withdrawable circuit-breaker
(7) Self-tapping screw M4x16

When the withdrawable unit is ordered complete with circuit-breaker, the rated current coding is already set in the factory. If a fixed-mounted circuit-breaker has to be converted into a withdrawable circuit-breaker, the rated current coding must be retrofitted.

Retrofitting the rated current coding

Mount the coding bolts at the circuit-breaker feet and at the guide rails according to the following scheme:

Frame size	Rated current	Coding			
		Circuit-breaker		Withdrawable unit	
		Left	Right	Left	Right
IZM(IN).1-...	1000 A				
	1600 A				
IZM(IN).2-...	2000 A				
	2500 A				
	3200 A				
IZM(IN).3-...	4000 A				
	5000 A				
	6300 A				

19.2.2 Option-related coding

Circuit-breakers and withdrawable units can be retrofitted with a version-related coding.

In this way, the circuit-breaker and the withdrawable unit can be assigned to each other unmistakably considering different equipement. If the circuit-breaker and the withdrawable unit have a different coding, it will not be possible to rack in the circuit-breaker.

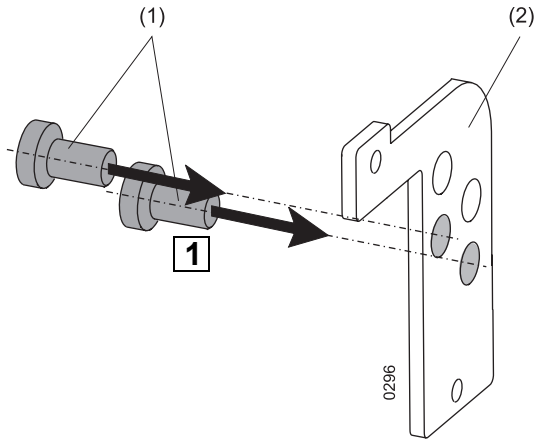
There are 36 selectable coding possibilities.

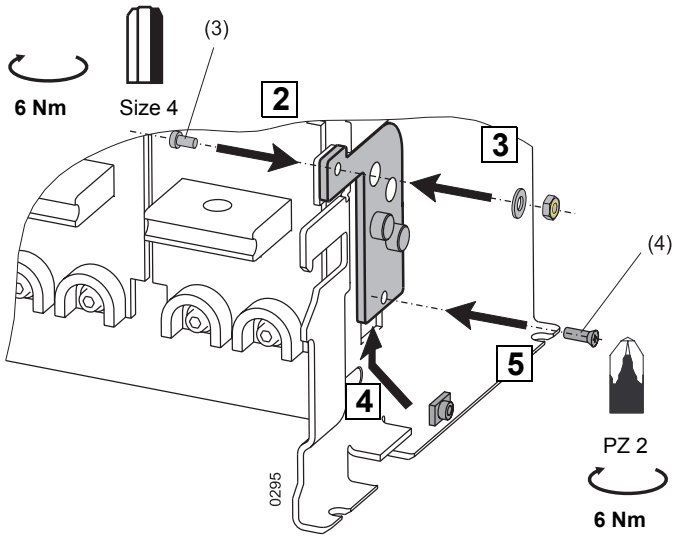
Before installation:

– Switching off and discharging the spring(→ page 24 – 2)

– Remove the circuit-breaker from the withdrawable unit (→ page 24 – 3)

Fitting coding onto circuit-breaker





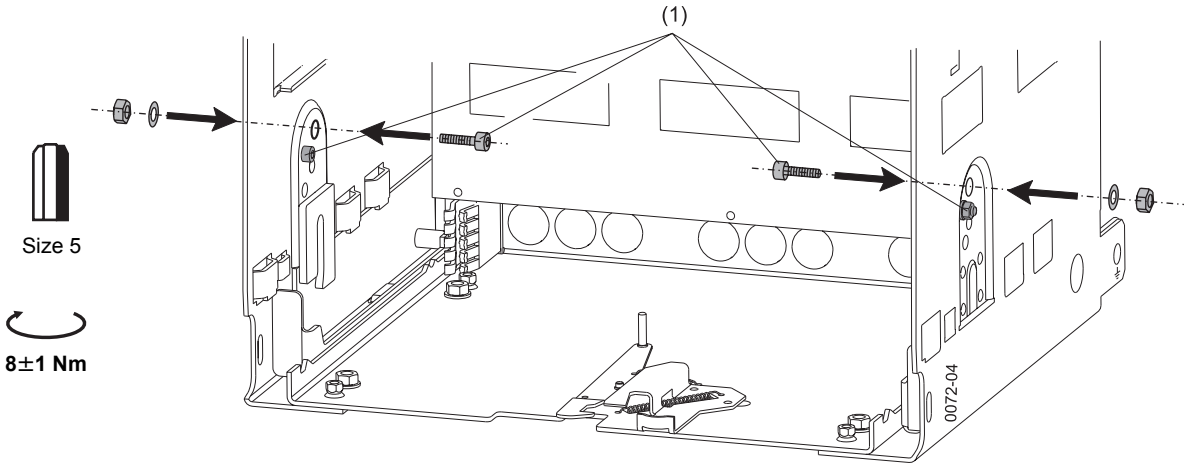
(1) Coding pins
(2) Coding plate
(3) Hexagon socket bolt M5 with strain washer and nut
(4) Countersunk-head bolt M5 with square nut

For IZM(IN).3-...:

– Mount coding plate in horizontally mirrored position

– For fixing only the two bolts are required without nuts and washers.

Fitting coding on withdrawable unit

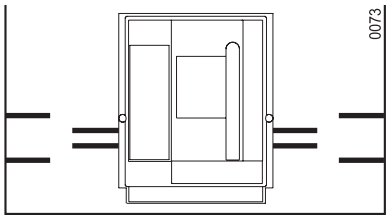


(1) Max. 4 hexagon socket bolts M6 with strain washer and nut as coding element

Then:

– Insert the circuit-breaker in the withdrawable unit and rack into connected position (→ page 6 – 1)

Coding variants

No.	 ● = with coding element ○ = without coding element	Used for:
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
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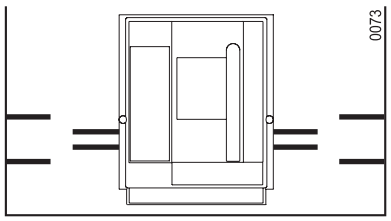
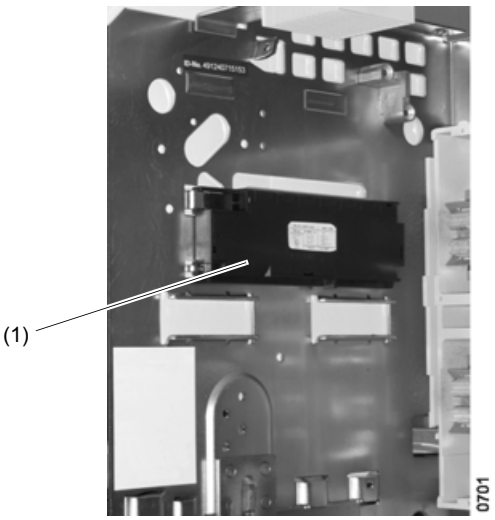
17		
18		

No.	 ● = with coding element ○ = without coding element		Used for:
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			

19.3 Position signalling switch for withdrawable unit

Position signalling switches can be retrofitted at the withdrawable unit. With their help, the circuit-breaker position in the withdrawable unit can be evaluated on the customer's side.



(1) Position signalling switch module

There are three options available.

Option 1:

– S30: Signalling switch for disconnected position
– S31 Signalling switch for test position
– S34 Signalling switch for connected position

Option 2:

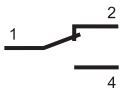
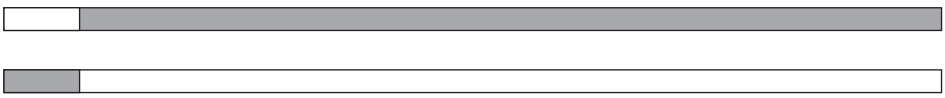
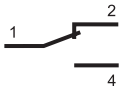
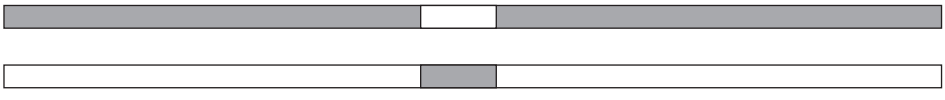
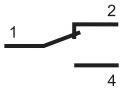
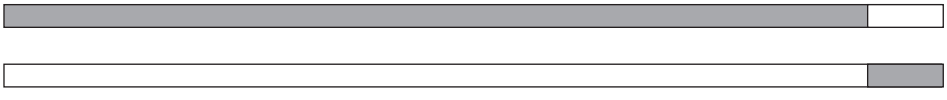
– S30: Signalling switch for disconnected position
– S31/S32 Signalling switch for test position
– S33/S34/S35: Signalling switches for connected position

Connections

A row of spring terminals for rated cross section
1 x 0.5 mm^2 to 1 x 2.5 mm^2.

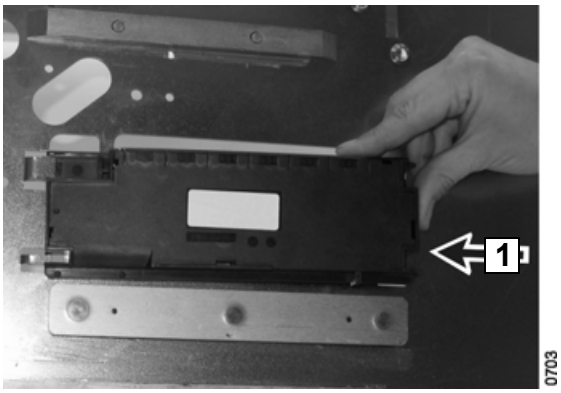
Position signalling switch module	Part no.
Option 1:	(+)IZM-XHIAV1
Option 2:	(+)IZM-XHIAV2

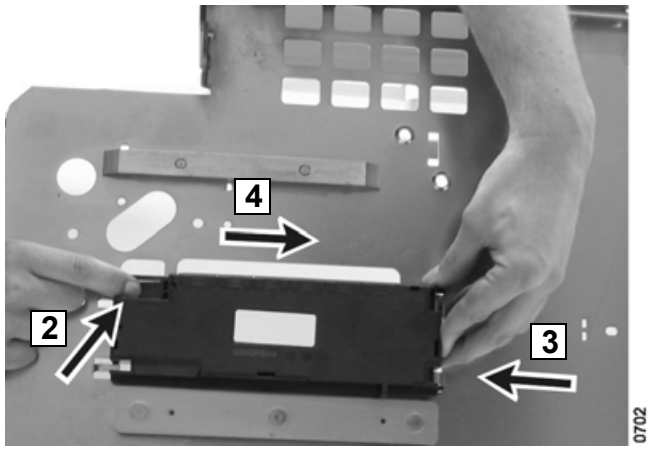
Circuit-breaker position and contacts

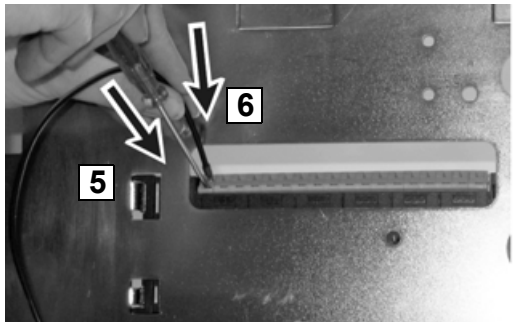
Signalling switch	Contacts	Circuit-breaker position		
		Disconnected position	Test position	Connected position
S30				
S31/S32				
S33/S34/S35				

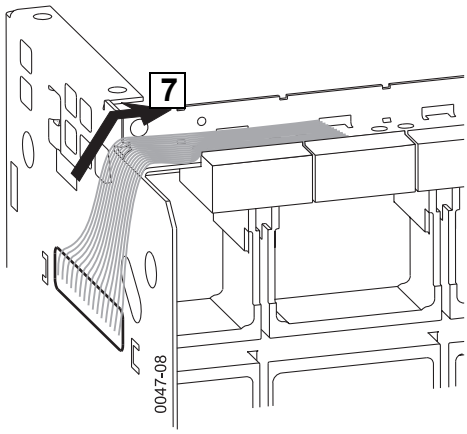
– Contact opened
– Contact closed

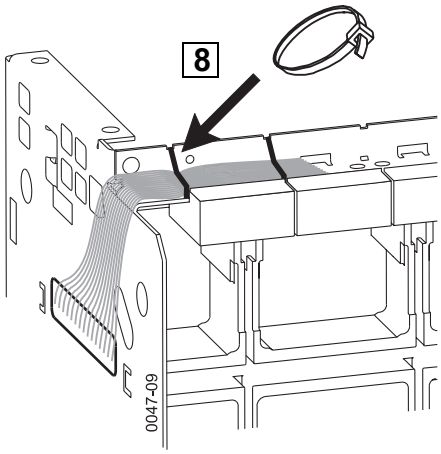
Mounting









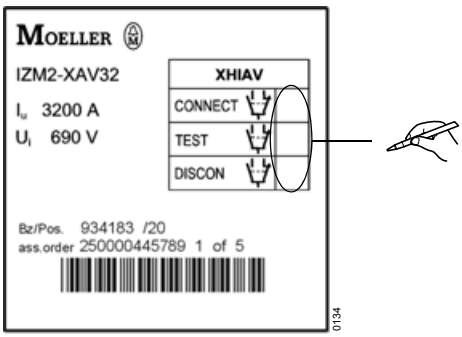


Then:

– Insert the circuit-breaker in the withdrawable unit and rack into connected position (→ page 6 – 1)

Updating the withdrawable unit label

Use an indelible ink pen

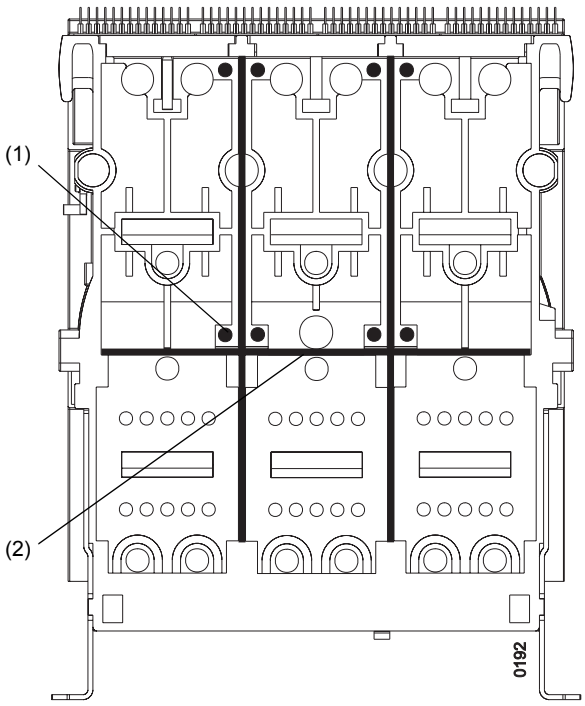


20 Phase barriers

The panel manufacturer can provide phase barriers made of insulating material as a short-circuit barrier. The necessary guide slots and fixing points are provided on the rear wall of the fixed-mounted circuit-breakers and the withdrawable unit.

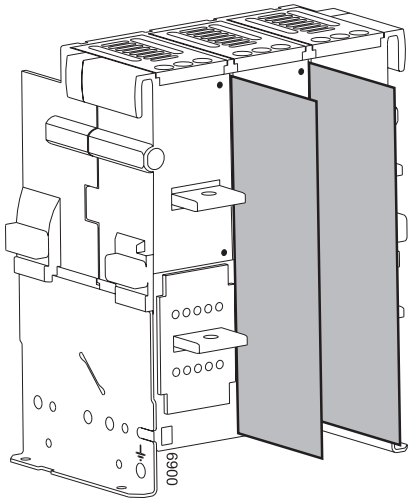
Usable material:

e.g. G-Etronax PM GPO3 from the company Elektro-Isola A/S, Danmark.

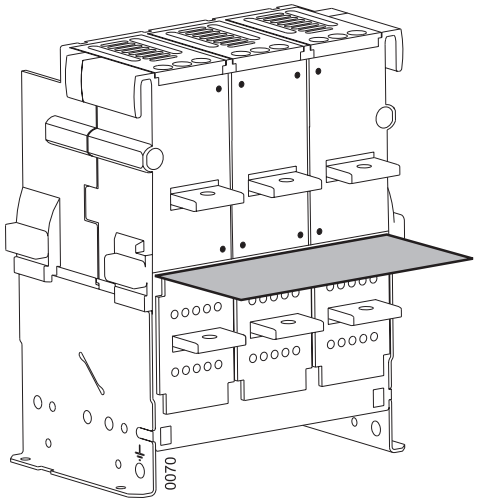


(1) 8 mounting holes for self-tapping screw ∅ 4.2 mm, screw-in depth max. 16 mm
(2) Guide slot 4 mm wide

Vertical



Horizontal



21 Arc chute covers

The arc chute cover is an optional accessory for the withdrawable units.

It is provided to protect panel parts located directly over the circuit-breaker.

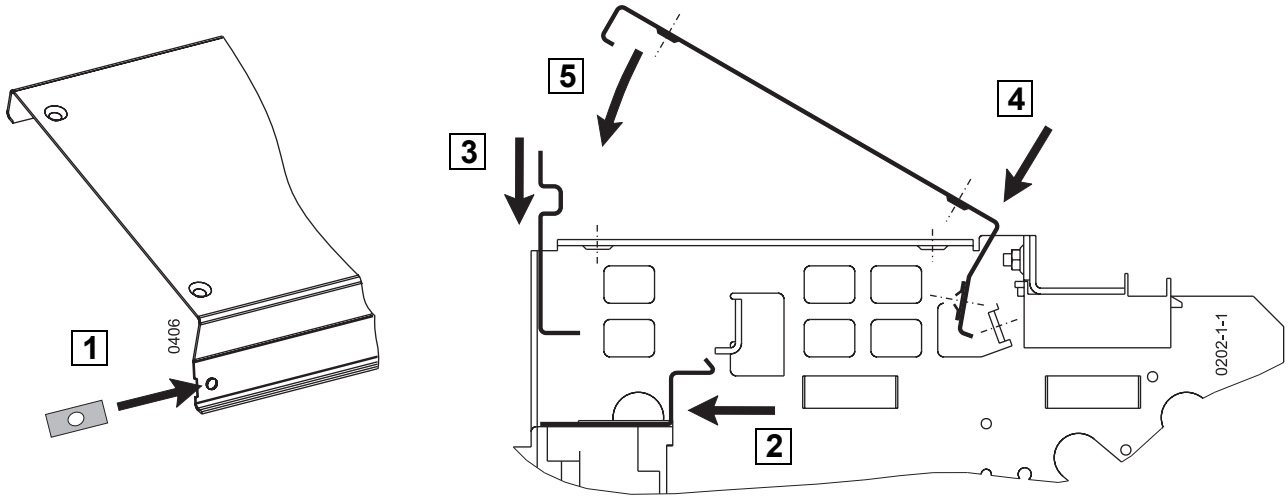
	No. of poles	Frame size	Part no.
Arc chute cover for Withdrawable unit	3	IZM(IN).1-...	(+)IZM1-XLKA-AV
		IZM(IN).2-...	(+)IZM2-XLKA-AV
		IZM(IN).3-...	(+)IZM3-XLKA-AV
	4	IZM(IN).1-...	(+)IZM1-XLKA4-AV
		IZM(IN).2-...	(+)IZM2-XLKA4-AV
		IZM(IN).3-...	(+)IZM3-XLKA4-AV

21.1 Retrofitting

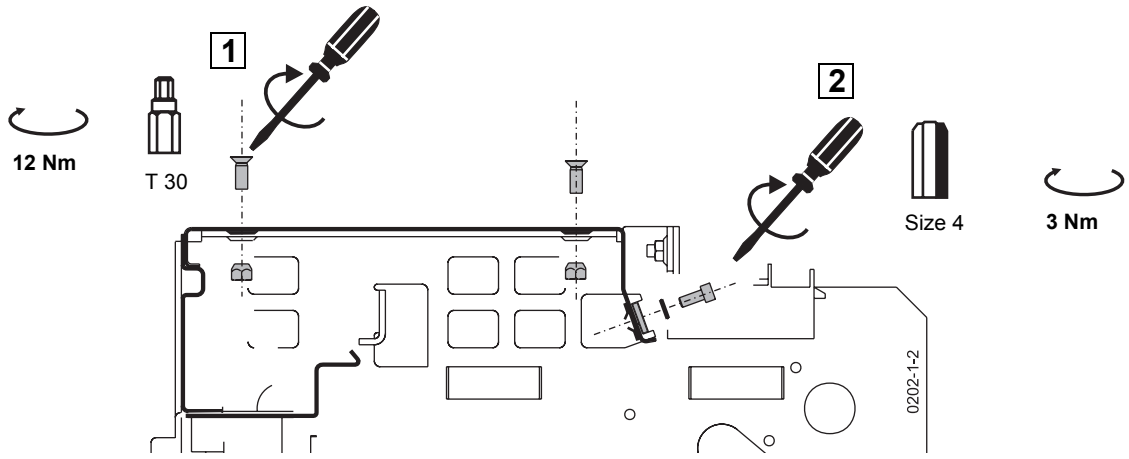
	Danger
 	**Dangerous voltage.** **Can cause death or serious personal injury as well as damage to device and equipment.** Before working on the device be sure to switch off the switchboard and earth the device. Switch off circuit-breaker and remove from withdrawable unit.

– Switching off and discharging the spring (→ page 24 – 2)
– Remove the circuit-breaker from the withdrawable unit (→ page 24 – 3)

IZM(IN).1-... and IZM(IN).2-...

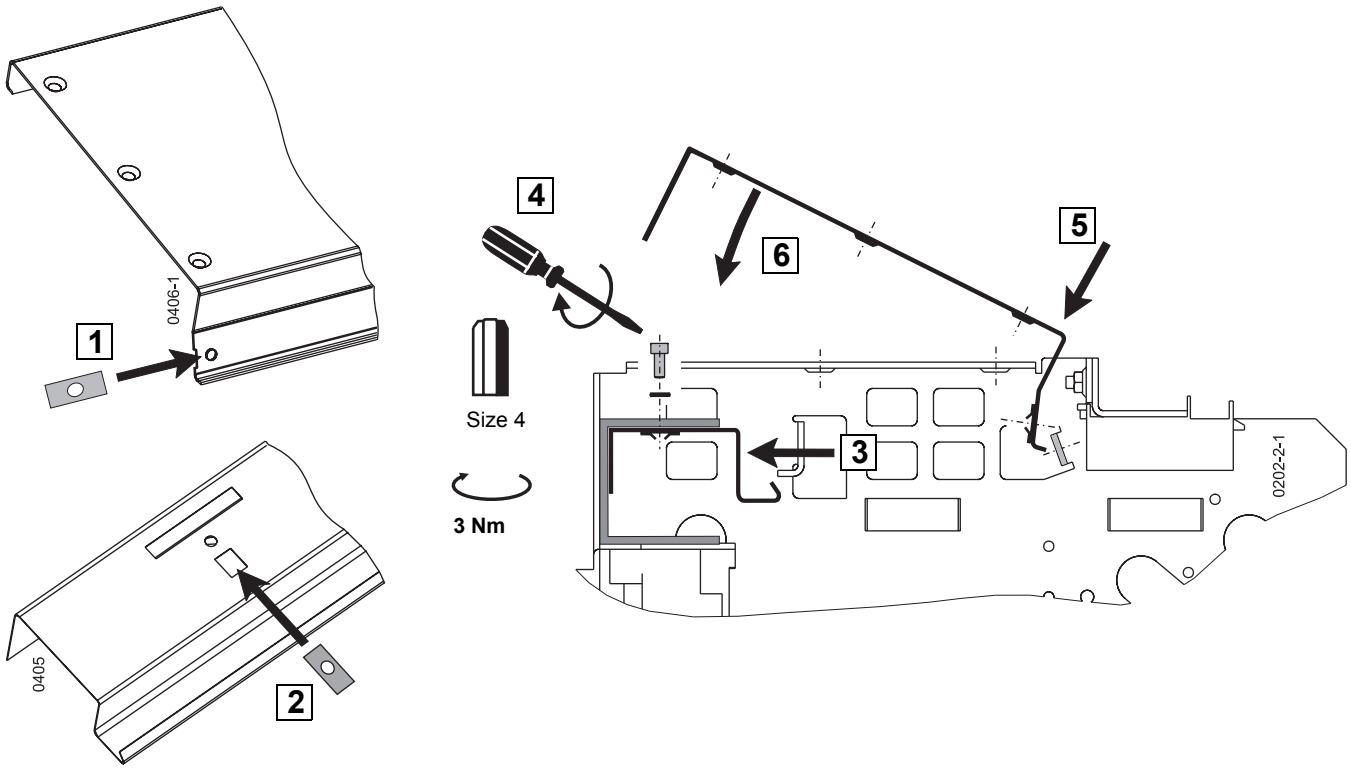


1 Slip one quick nut each over the right-side and left-side fixing holes of the cover
2 Insert partition
3 Insert “rear cover”
4 Insert “top cover” behind the fixing straps of the side walls and
5 Lay onto withdrawable unit

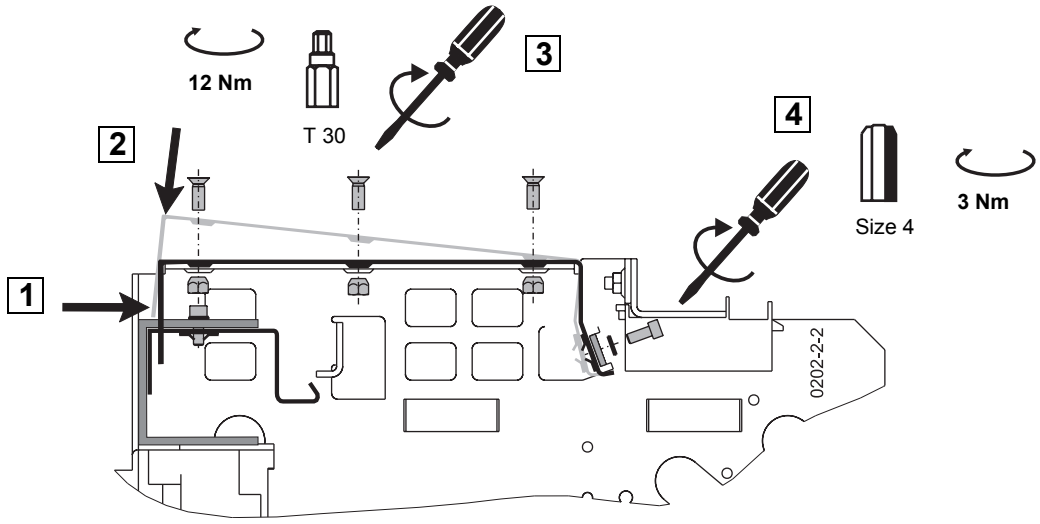


1 Fix “top cover” with: 4x M6x16 with cone-nut
2 2× M5x12 with strain washer

IZM(IN).3-...



1 Slip one quick nut each over the right-side and left-side fixing holes of the cover
2 Insert quick nuts in partition
3 Lay partition into cross member
4 Fix partition: 2x M5x12 with strain washer
5 Insert cover behind fixing straps of side walls and
6 Set down



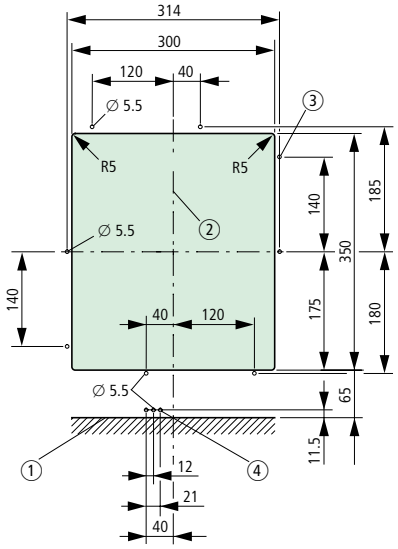
1 Press rear cover retainers into the slots of the cross member
2 Press cover down
3 Fix cover: 6x M6x16 with cone nut
4 2x M5x12 with strain washer

22 Door sealing frame IP41

	Part no.
Door seal	IZM-XRT

Dimension drawing of door cut-out

Front view of the panel door

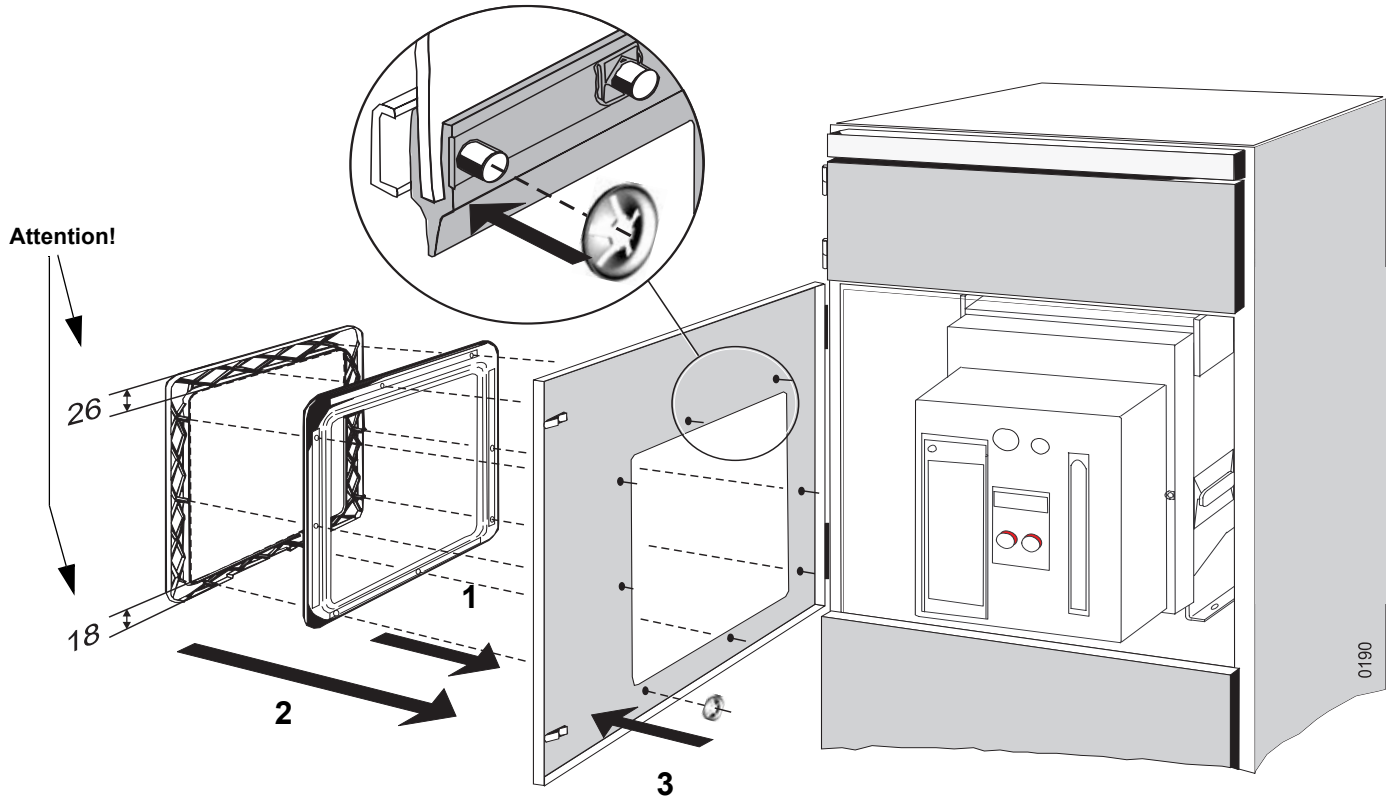


① Mounting surface of circuit-breaker or of withdrawable unit
② Centre of front panel
③ 8 × mounting bores for door sealing frame
④ 3 × mounting bores for optional door lock

Note

Cannot be combined with XDT.

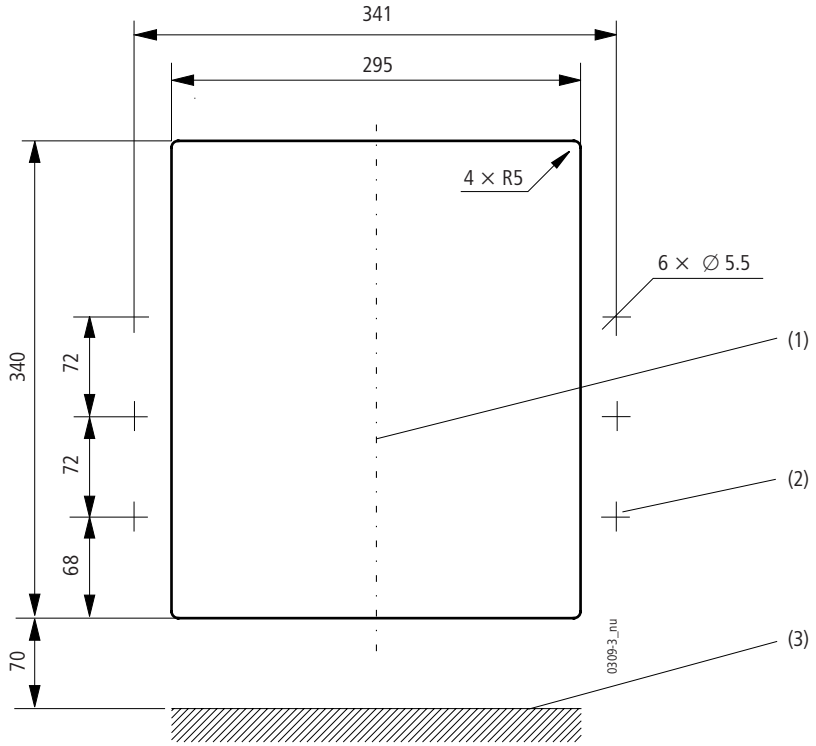
Inserting the sealing frame



23 Shrouding cover IP55

	Part no.
Protective cover	IZM-XDT

Dimension drawing for door cut-out and mounting holes

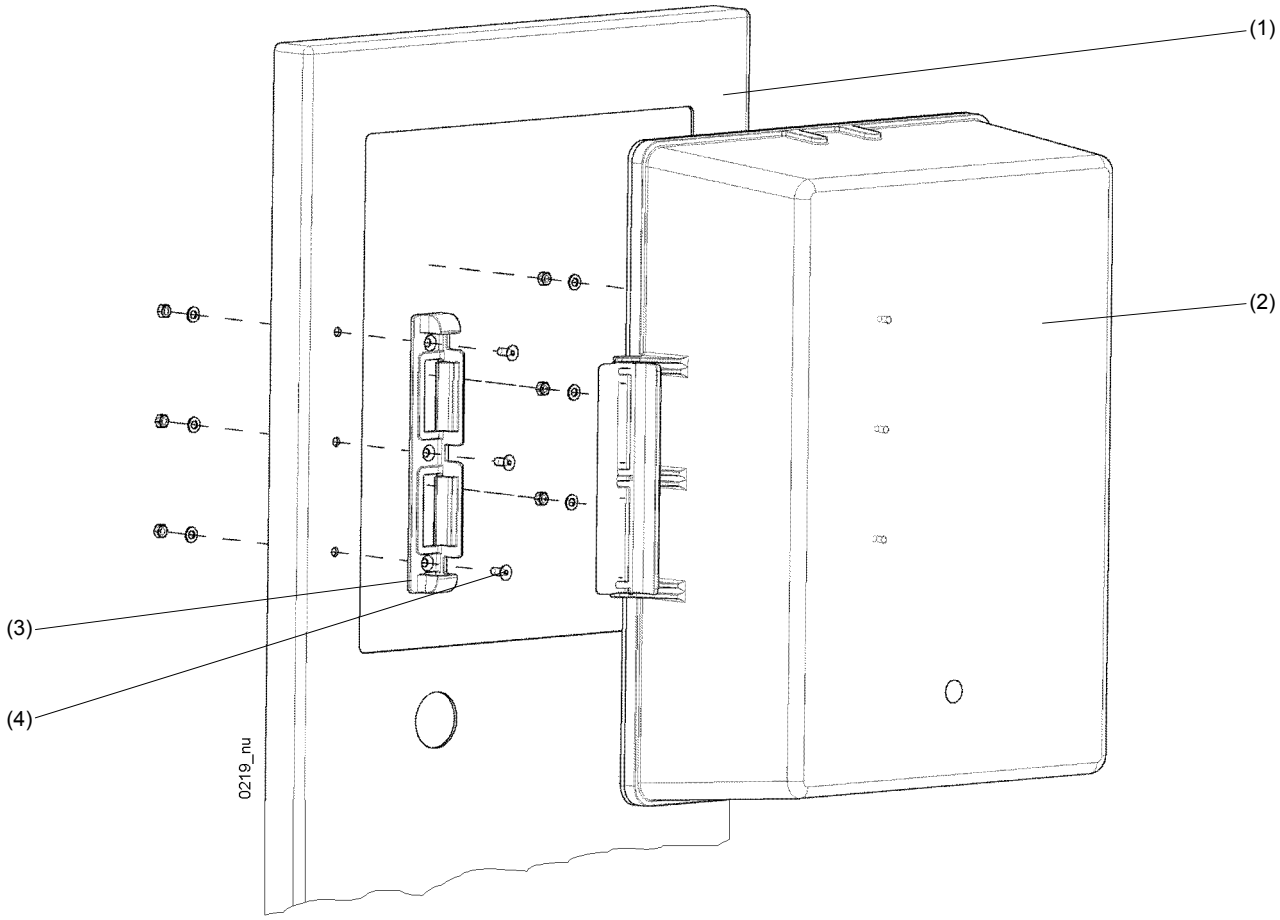


(1) Centre of front panel
(2) 6 drill holes for mounting hinges
(3) Mounting surface of circuit-breaker or of withdrawable unit

Note

Cannot be combined with XRT.

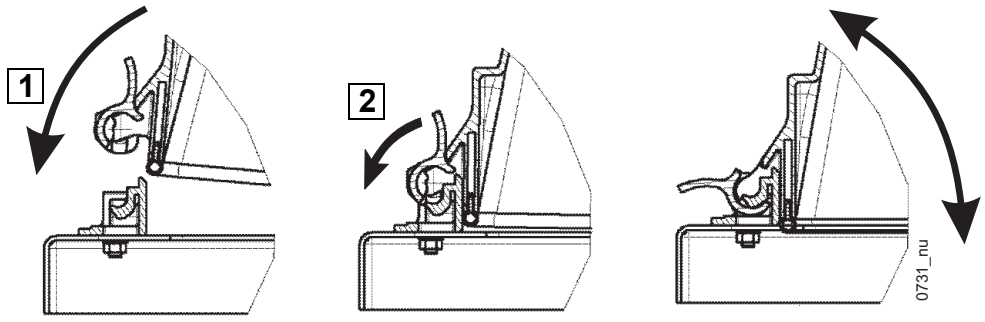
Mounting shrouding cover



(1) Cubicle door with door cut-out
(2) Protective cover
(3) 6 × Allen screws M5 with washers and safety nuts
(4) Hinge with (right and left) opening function

Installation of the right side hinge in the same fashion.

Handling:



24 Maintenance

Danger

Hazardous voltages are present in this electrical equipment during operation.
Failure to properly maintain the equipment can result in death, severe personal injury or substantial property damage.

The instructions contained in this chapter and on product labels have to be followed.
The maintenance may only be carried out by suitably qualified personnel.
Before beginning work, de-energize the panel and secure the de-energized state during work (according to EN 50 110-1, DIN VDE 0105-100 and BGV A2).
Observe the Five Safety Rules:

- Disconnecting
- Ensure that devices cannot be accidentally restarted.
- Verify isolation from the supply.
- Earthing and short-circuiting
- Covering or providing barriers to adjacent live parts

Disconnect the equipment from the supply.
Use only authorized spare parts in the repair of the equipment.
The specified maintenance intervals as well asthe instructions for repair and exchange must be strictly adhered to prevent injury to personnel and damage to the switchboard.

Note

For the maintanence of your circuit-breaker our After Sales Service can be used.
To contact After Sales Service: → chapter 26.

Contacts should be changed according to condition but at the latest after

- 10 000 operations for IZM(IN).1-... and IZM(IN).2-...;
- 5 000 operations for IZM(IN).3-...;
- 1 000 operations for IZM(IN).2-... and IZM(IN).3-...; at 1000 V operation

The user must set inspection intervals for the circuit-breaker depending upon it´s operating conditions :

- minimum once a year
- after heavy switch-offs
- after tripping by the electronic overcurrent release
- down-stream circuit-breakers must also be checked

During the inspection and or after 1000 rated current switch-offs must be checked: (max. operation corresponding to catalogue information):

- Arc chute and contact system
- Electrical and mechanical function of the circuit-breaker
- The functioning of the ON and OFF switching
- Check main and control circuit, function and tightness of connection.
- Settings of the electronic overcurrent releases to be checked for plausability and against the system cicumstances, and if necessary corrected.

After reaching the end of the life span of the circuit-breaker/ exchanged parts are to be disposed of by the user to the valid legal requirements.

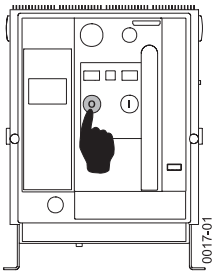
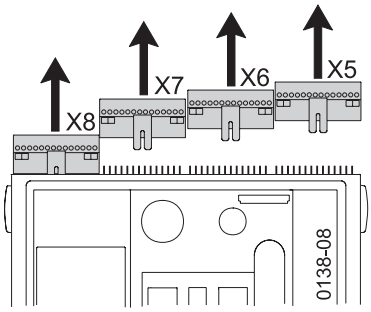
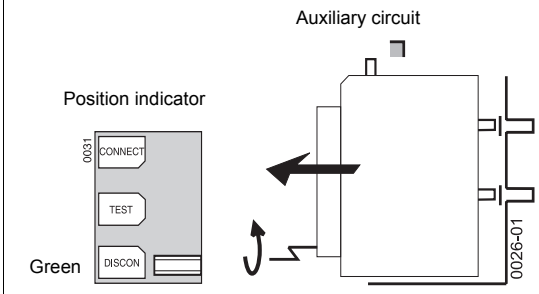
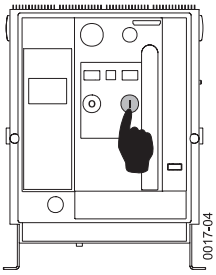
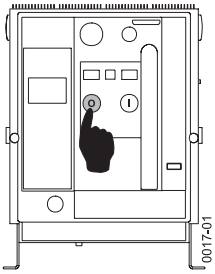
Withdrawable units with arc chute covers are to be exchanged at the latest after three short-circuits in the circuit-breaker.

The arc chutes and the contact system must be replaced depending upon their condition, but latest after 10 000 switching operations.

Depending on the circuit-breaker stress it may also be necessary to replace the operating system after 10 000 switching operations.

24.1 Preparation for maintenance

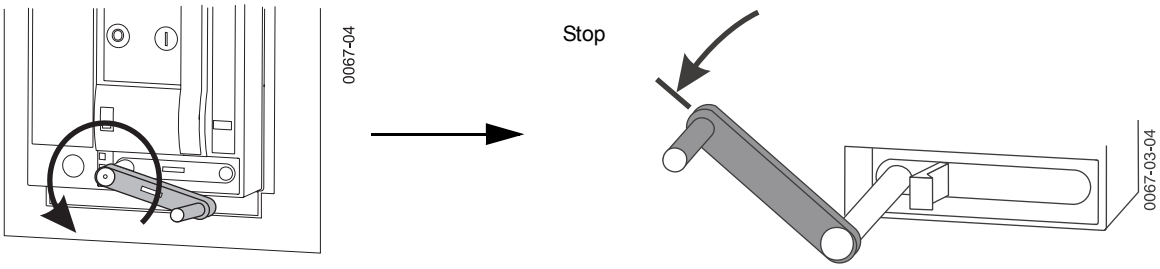
24.1.1 Switch off and discharge the spring

	Fixed-mounted circuit-breaker	Withdrawable units
1 **OFF**		
2 **Disconnect auxiliary circuits**		
3 **ON**		
4 **OFF**		
5 **Indications**		

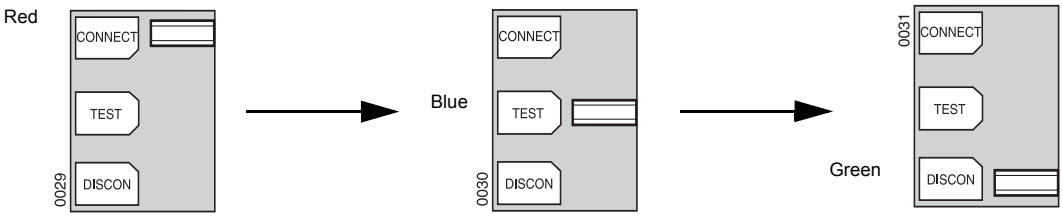
24.1.2 Remove the circuit-breaker from the withdrawable unit

Crank the circuit-breaker into disconnected position

– Switch off (→ page 6 – 5)
– Unclamp and withdraw racking handle (→ page 6 – 3)



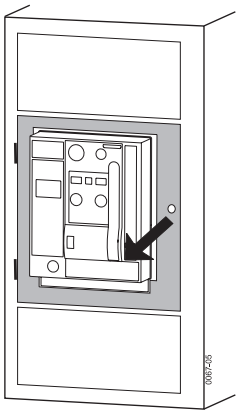
Position indicator



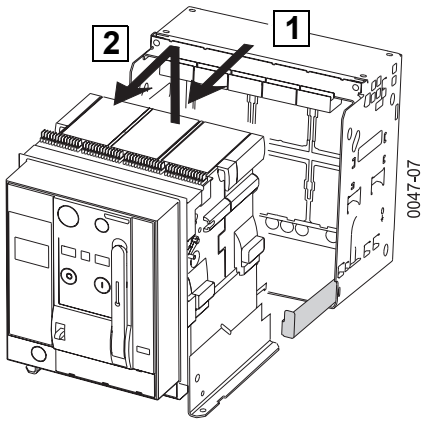
Inserting racking handle

CAUTION
Do not turn the crank handle beyond the stop! Otherwise the racking mechanism will be damaged.

Open control panel door



Pull circuit-breaker to maintenance position and remove



24.2 Checking arc chutes

	WARNING
	Before beginning to work, de-energize the panel and secure the de-energized state during work (according to EN 50110-1, DIN VDE 0105-100 and BGV A2). Observe the Five Safety Rules: – Disconnecting – Ensure that devices cannot be accidentally restarted. – Verify isolation from the supply. – Earthing and short-circuiting – Covering or providing barriers to adjacent live parts Disconnect the equipment from the supply.

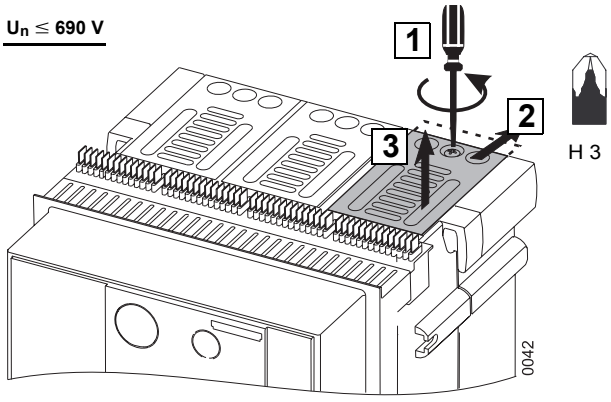
24.2.1 Removing arc chutes

– Switching off and discharging the spring(→ page 24 – 2)

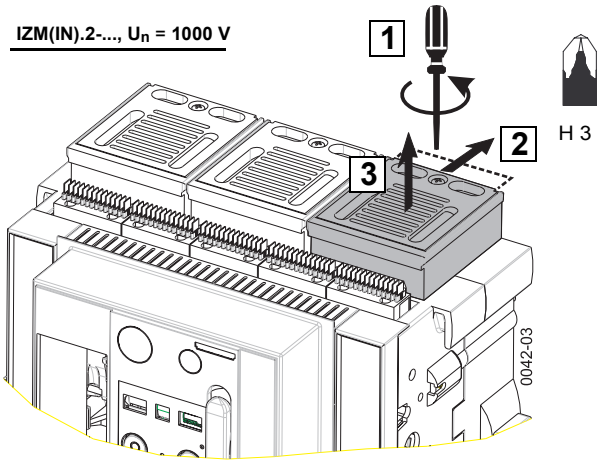
– Move withdrawable circuit-breaker to maintenance position (→ page 24 – 3)

CAUTION
Risk of breaking! Do not place the arc chute vertically on the insulating walls, but lay it on the side.

$U_n \leq 690$ V

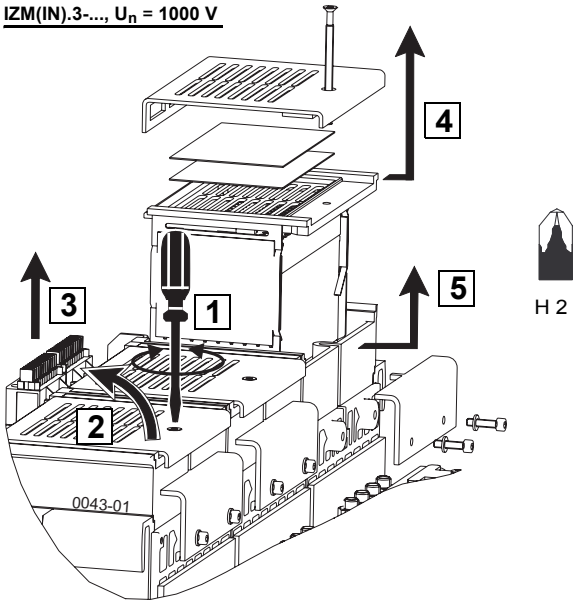


IZM(IN).2-..., U_n = 1000 V



1 Turn out the screw about 15 mm, don't take it out
2 Push the cover back
3 Take out the arc chute; in the 1000 V version, with intermediate unit

IZM(IN).3-..., U_n = 1000 V



1 Screw out screw approx. 15 mm , do not remove; IZM(IN).3-...: screw completely out
2 Slide cover back; IZM(IN).3-...: carefully lift cover
3 Remove cover
4 Slide arcing chamber backwards and remove
5 Slide divider backwards and remove

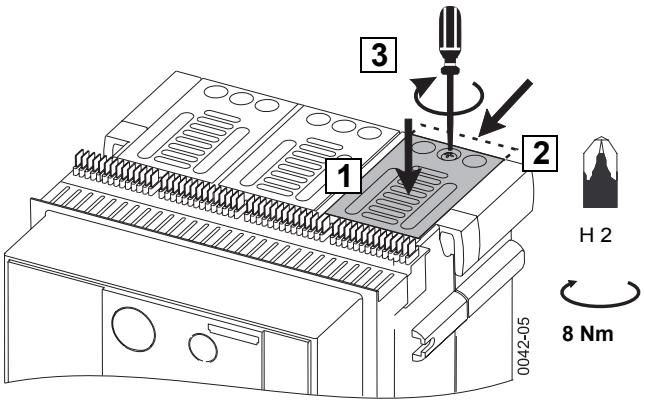
24.2.2 Visual inspection

In the case of heavy wear (burnout on arc splitter plates), replace the arc chutes.

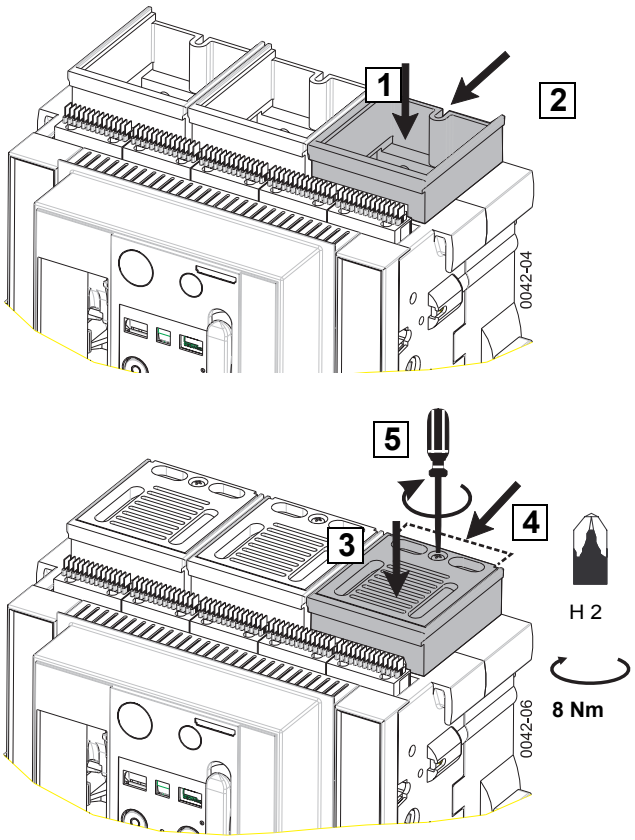
Part nos on request.

24.2.3 Installing arc chutes

Circuit-breakers with rated voltages up to 690 V

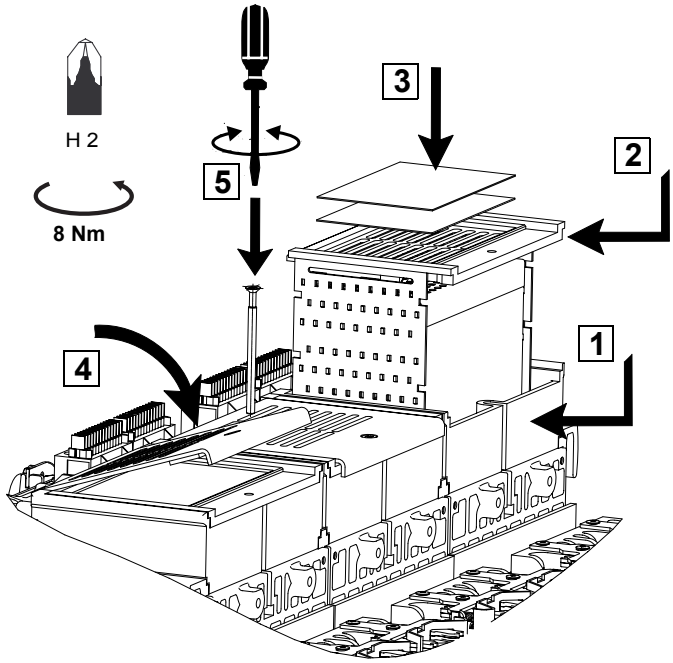


Circuit-breakers for 1000 V rated voltage



1 Install intermediate unit
2 Shift intermediate unit
3 Insert arc chute, push cover back before doing so
4 Push cover to the front
5 Tighten the screw

Circuit-breaker BGIII for 1000 V rated voltage



1 Fit intermediate piece and slide forward
2 Fit arcing chamber and slide cover forward
3 Fit sieves (2x) in arc chute extension
4 Fit sheet steel cover
5 Insert and tighten screws

24.3 Check contact wear

Danger

Hazardous voltage!

Can cause death or serious personal injury as well as damage to device and equipment.

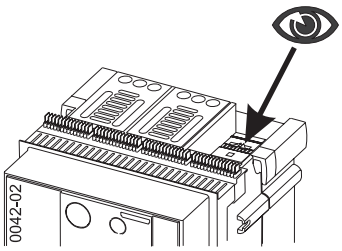
Before working on this device the system must be switched off.

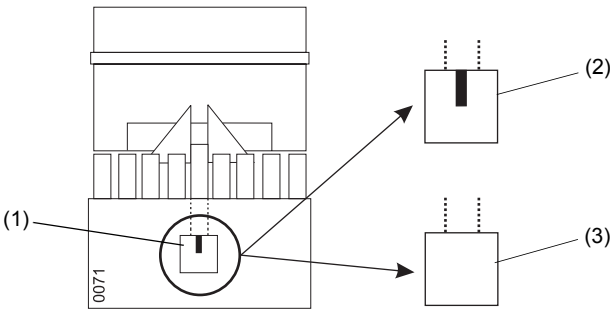
WARNING

Can cause death or personal injury.

Before removing any covers and the operating panel of the circuit-breaker be sure to discharge the storage spring.(→ page 24 – 2)

– Switching off and discharging the spring(→ page 24 – 2)
– Move withdrawable circuit-breaker to maintenance position (→ page 24 – 3)
– Charge the spring manually (→ page 6 – 4)
– Switch on (→ page 6 – 5)
– Remove arc chutes(→ page 24 – 4)





(1) Indicator pin
(2) Indicator pin visible
(3) Indicator pin no longer visible

If the display pin is no longer visible the contact system must be exchanges.

For the visual check with fixed circuit-breakers a mirror may have to be used.

24.4 Replacing pole assembly

Danger

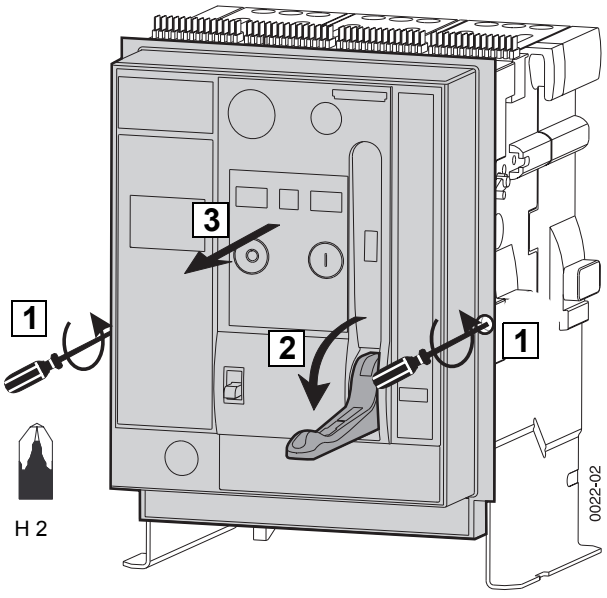
Hazardous voltages are present in this electrical equipment during operation.
Failure to properly maintain the equipment can result in death, severe personal injury or substantial property damage.

The instructions contained in this chapter and on product labels have to be followed.
The maintenance may only be carried out by suitably qualified personnel.
Before beginning work, de-energize the panel and secure the de-energized state during work (according to EN 50 110-1, DIN VDE 0105-100 and BGV A2).
Observe the Five Safety Rules:
- Disconnecting
- Ensure that devices cannot be accidentally restarted.
- Verify isolation from the supply.
- Earthing and short-circuiting
- Covering or providing barriers to adjacent live parts

Disconnect the equipment from the supply.
Use only authorized spare parts in the repair of the equipment.
The specified maintence intervals as well asthe instructions for repair and exchange must be strictly adhered to to prevent injury to personnel and damage to the switchboard.

– Switching off and discharging the spring(→ page 24 – 2)
– Remove the circuit-breaker from the withdrawable unit (→ page 24 – 3)
– Remove fixed-mounted circuit-breaker

24.4.1 Remove front panel



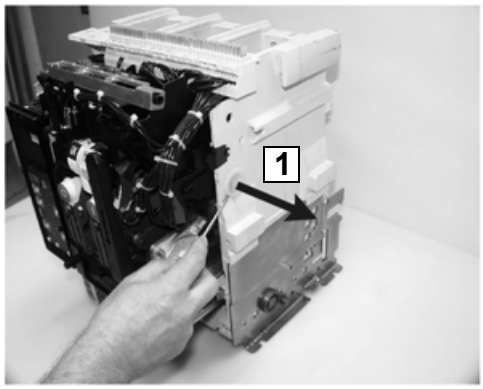
24.4.2 Remove arc chutes

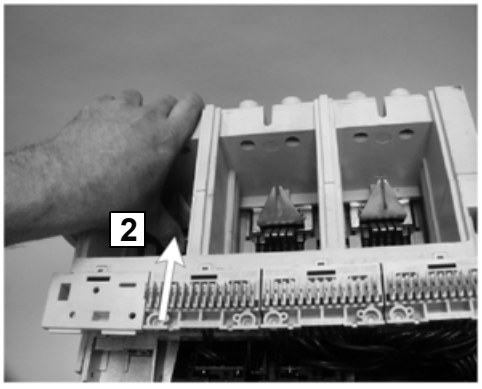
(→ page 24 – 4)

24.4.3 Removing pole assemblies

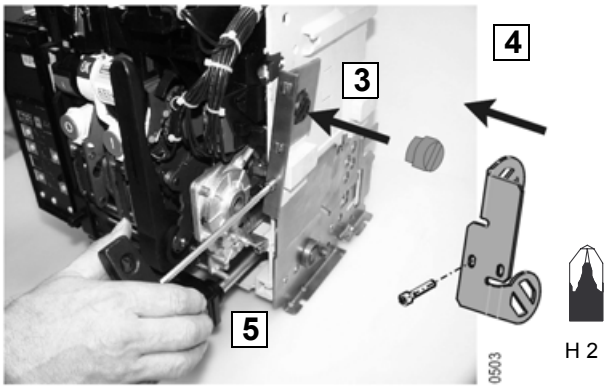
Mounting switching shaft retainer

CAUTION
Block switching shaft in any case! Otherwise the operating system will be de-adjusted and it will be necessary to have it repaired in the factory.



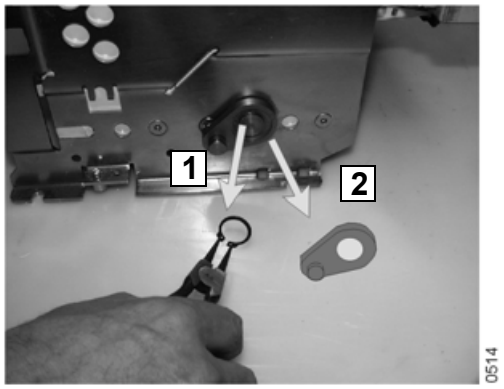


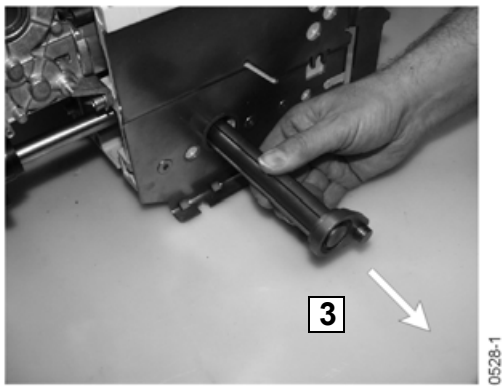
1 Remove cover
2 Press contacts together and hold them



3 4 5 Mount and fix switching shaft retainer

For withdrawable circuit-breakers only: removing racking shaft



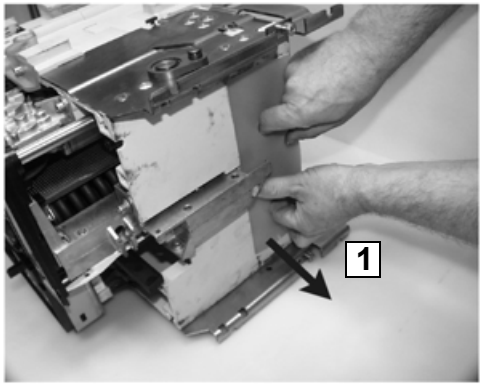


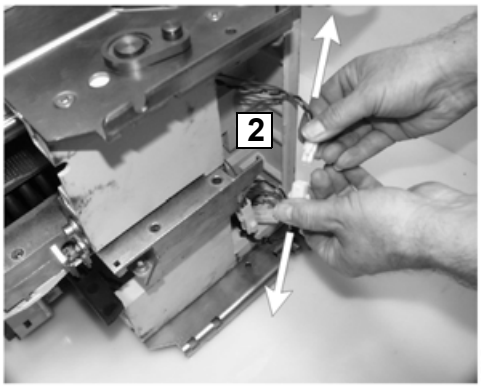
1 Remove retaining ring
2 Remove crank
3 Pull out racking shaft on the other side

Removing current transformers

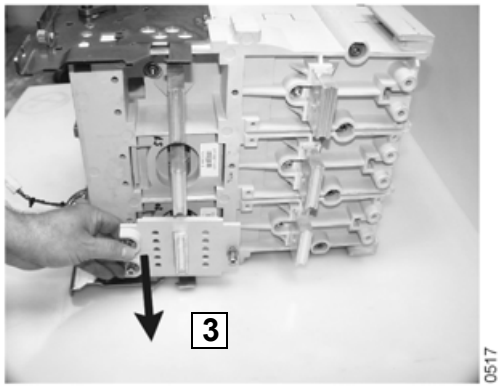
Lay circuit-breaker on the left side

	CAUTION
⚠	The operating shaft on the right hand side may not change its position with the following steps!

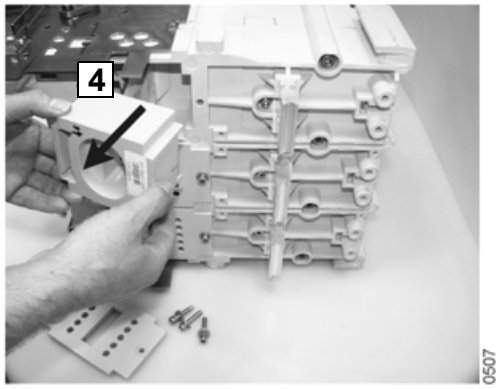




1 Remove cover of cable duct
2 Detach connectors

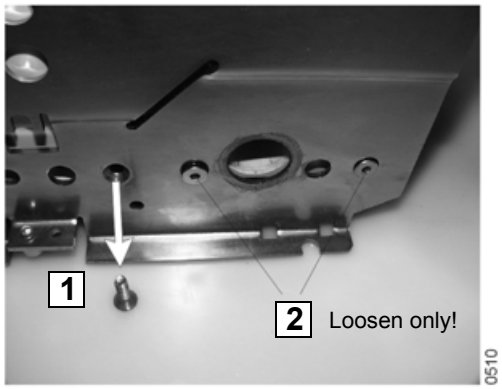


Size 5



3 Remove current transformer covers
4 Remove current transformers

IZM(IN).1-.../IZM(IN).2-... loosen circuit-breaker feet



Size 4

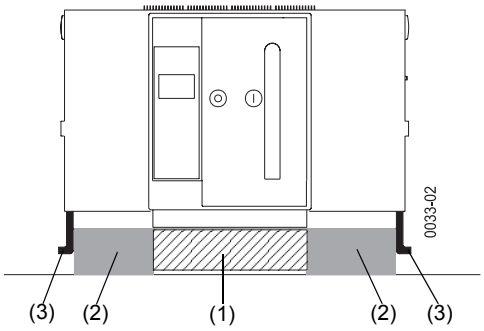
1 Place circuit-breaker in upright position, undo both circuit-breaker feet, remove screw
2 Loosen only these screws!

IZM(IN).1-...: only one screw used

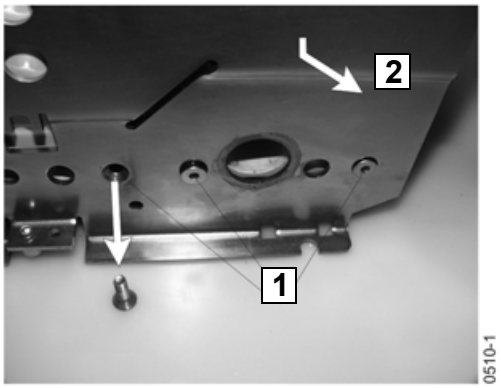
IZM(IN).3-... Removing circuit-breaker feet

CAUTION

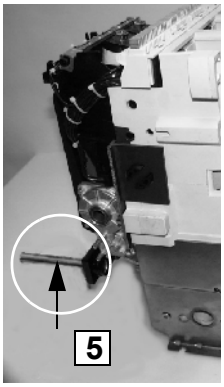
Before removing the screws place the circuit-breaker on a suitable support so that the feet are free.

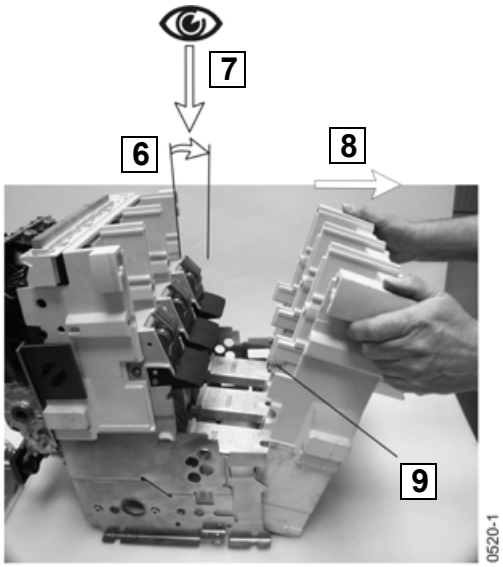


(1) Free area
(2) Suitable support
(3) Circuit-breaker feet



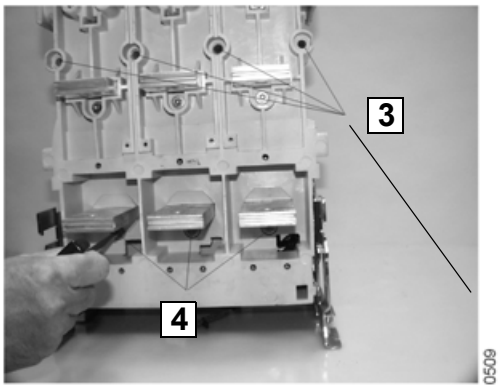
1 Remove screws
2 Remove circuit-breaker feet





5 Support circuit-breaker
6 Remove rear wall carefully until the end position retaining springs can be seen
7 Note the position of the end position retaining springs
8 Remove rear wall
9 Remove end position retaining springs

Removing rear wall

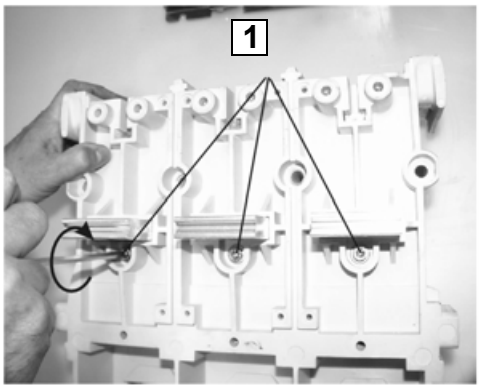


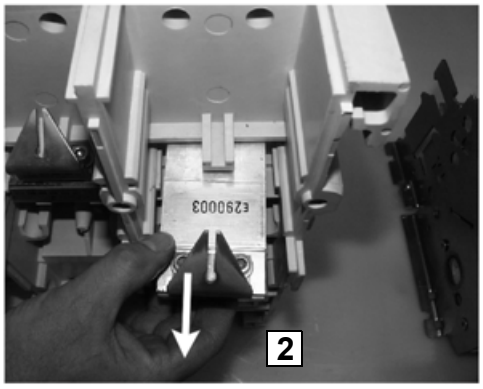
Size 6

IZM(IN).3-... only
Size 8

3 Remove upper screws
4 Remove lower screws

Removing upper fixed contacts

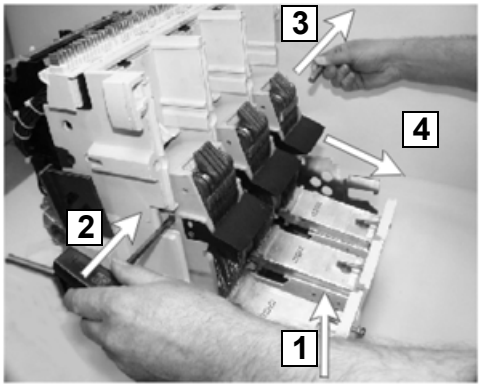




Size 5

1 Remove bolts and nuts
2 Remove fixed contact

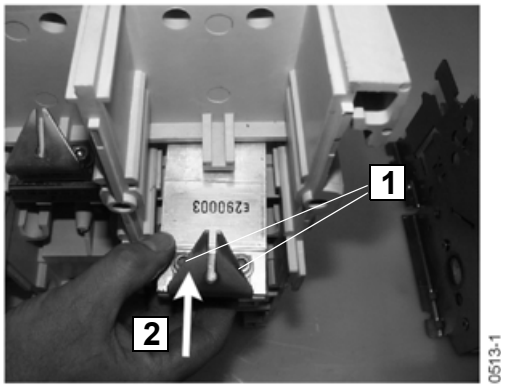
Removing lower moving contacts

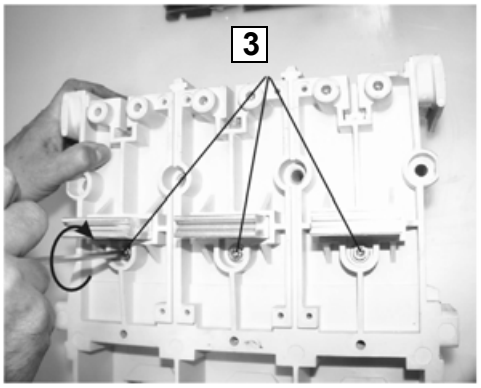


1 Support connecting bars
2 Press coupling bolt out
3 Take coupling bolt out
4 Remove pole assemblies

24.4.4 Installing pole assemblies

Installing upper fixed contacts in rear wall





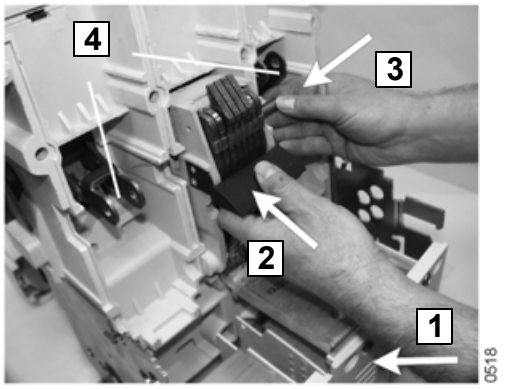
Size 5

10 Nm

1 **Only IZM(IN).1-...**: Undo screws of guide horns
2 Mount contact and insert square nut in recess
3 Fix contacts
Re-tighten screws of guide horns with 15 Nm
Only IZM(IN).1-...: press guide horn tight and tighten with 15 Nm

Installing lower moving contacts

Clean and grease bearings and coupling bolts before assembly.

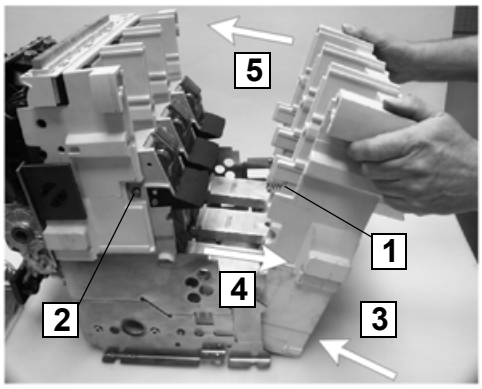


1 Mount supports for connecting bars
2 Mount central pole assembly
3 Insert coupling bolt
4 Mount external pole assemblies

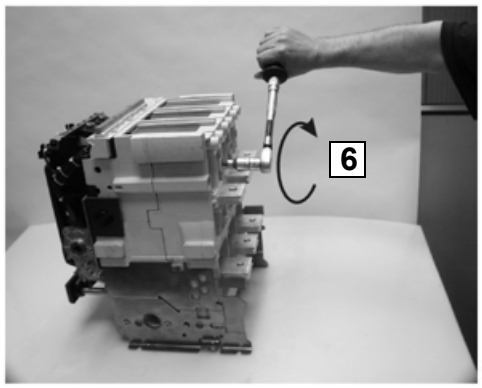
Installing rear wall

(First, remove supports for pole assemblies)

ATTENTION
Do not squeeze the cables of the transformer cable harness!



1 Insert end position retaining springs
2 Observe central seat of coupling bolts
3 Mount rear wall
4 Insert connecting bars
5 Place rear wall and circuit-breaker housing together



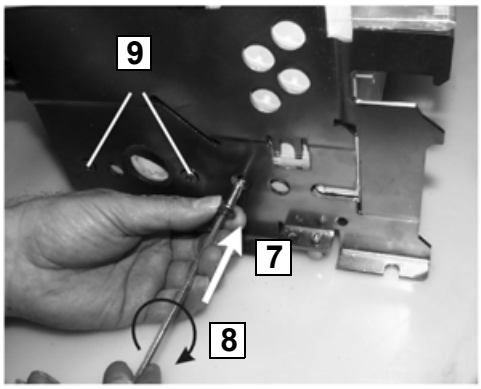
6 Screw tight at the bottom first, starting in the middle; short screws lower, long screws upper

IZM(IN).1-.../IZM(IN).2-...		IZM(IN).3-...	
Upper	Lower	Upper	Lower
Size 6	Size 6	Size 8	Size 6
18 Nm	**12 Nm**	**25 Nm**	**18 Nm**

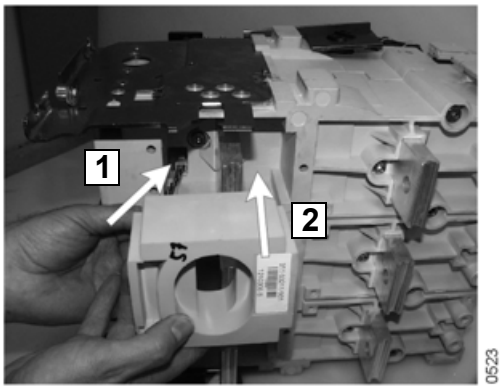
Function test:

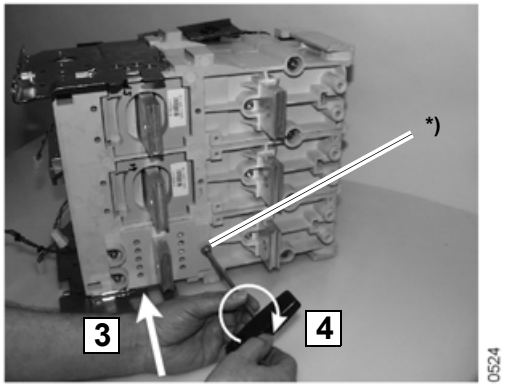
The contacts must allow themselves to be completely pressed against each other and thereafter must return to their original position automatically. Otherwise, loosen the rear wall and check, if the position of the end position springs is correct.

Tightening circuit-breaker mounts



Installing current transformers

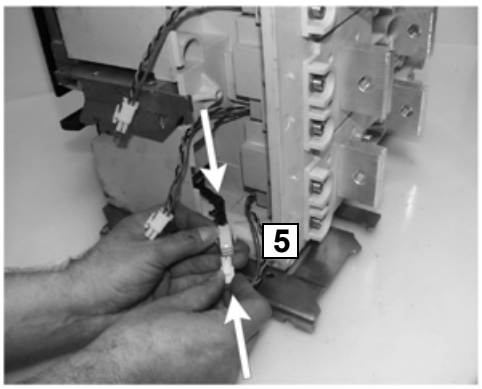


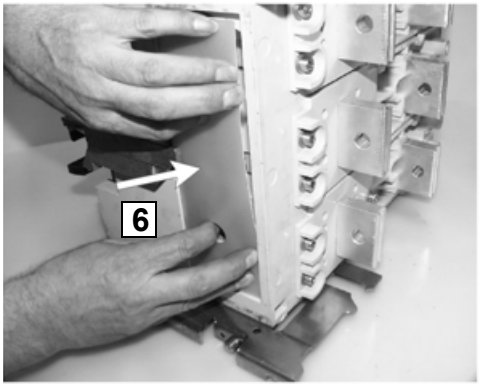


1 Lay circuit-breaker on the side, insert connecting wire
2 Insert CT
3 Fit transformer covers
4 Fasten the screws

*) Self-tapping screw only 5 Nm

CAUTION
When using self-tapping screws don´t damage the screw thread! Insert the screws as follows: – Insert screw – turn by hand anti-clockwise until the screw-thread is found – screw in – using torque wrench fix to 5 Nm.





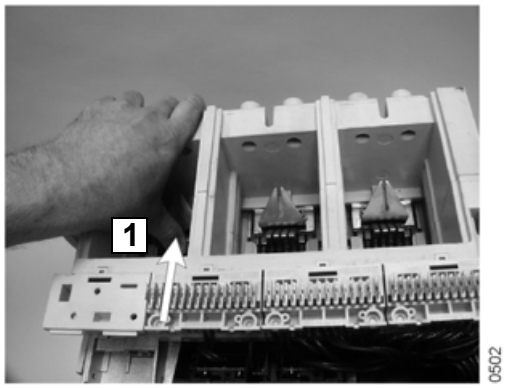
5 Establish plug connections
6 Mount cable duct covers

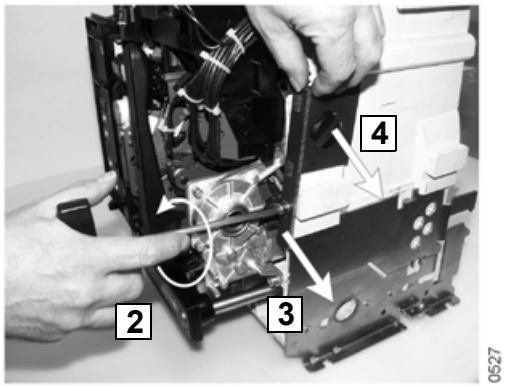
CAUTION

The completeness and stability of the plug connection must be assured!

This is only by correct contact of the plug connector.

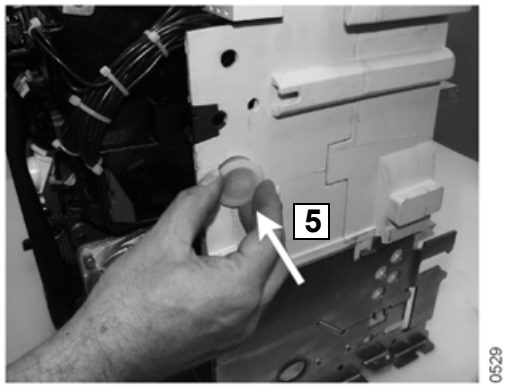
Removing switching shaft retainer





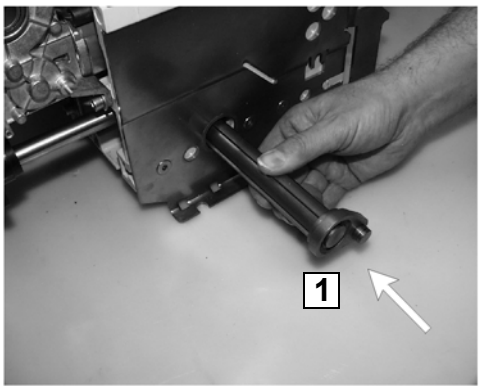
H 2

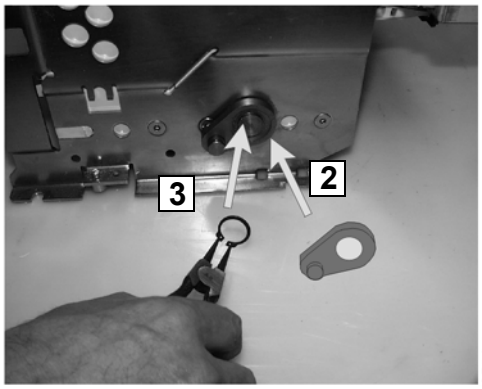
1 Place circuit-breaker in upright position, press contacts together and hold them
2 Detach switching shaft retainer
3 Remove switching shaft retainer
4 Remove driver



5 Mount cover

For withdrawable circuit-breakers only: Installing racking shaft

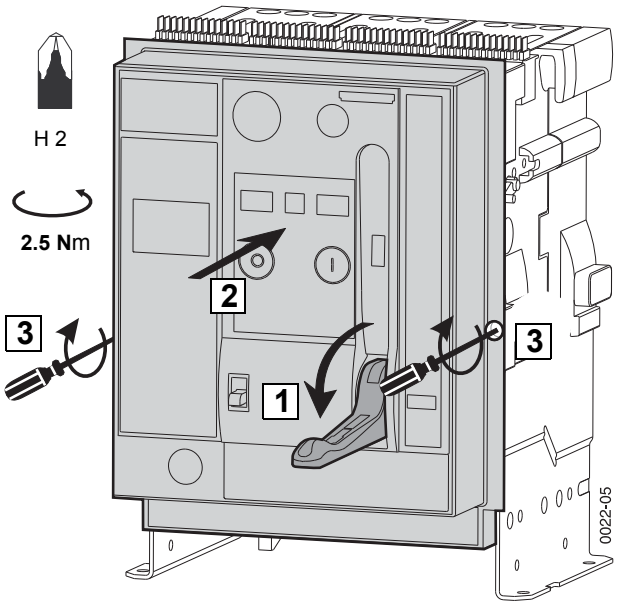




1 slide in
2 Fit crank
3 and secure

24.4.5 Article numbers on request

24.4.6 Fitting front panel



24.4.7 Mechanical function test

– Charge the spring manually (→ page 6 – 4)
– Switch on (→ page 6 – 4)
– Switch off (→ page 6 – 5)
– Recheck contact wear indicator (page 24 – 6)

24.4.8 Fitting arc chutes

(→ page 24 – 4)

24.5 Replacing operating system

The circuit-breaker operating system must be replaced by Eaton After Sales Service specialists.

To contact After Sales Service: → chapter 26.

25 Disposal

25.1 Disposal of IZM circuit-breakers

Eaton circuit-breakers are enviromentally compatable products that are manufactured predominately from recyclable materials.

For disposal we recommend disassembly/dividing into the following material groups:

– **Metal:** to recycle as mixed scrap.

– **Plastic:** for disposal as industrial waste for thermal recycling.

– **Electronic, insulated cable, motors:** Recycling via electrical waste recycler.

Due to the long life span of Eaton circuit-breakers, it is possible that when decommissioning the disposal instructions are no longer up to date or that national regulations specifiy other disposal methods.

Your local Eaton branch can answer your disposal questions.

26 Forms

Our After Sales Service personnel are available for maintainance or refitting of your circuit-breakers.

Eaton Industries GmbH
After Sales Service
Hein-Moeller-Str. 7-11
D-53115 Bonn

Tel.: +49(0)228 602 3640
Fax: +49(0)228 602 1789

AfterSalesEGBonn@eaton.com
www.moeller.net/aftersales

Note

Copy the formular on the next page. Do not remove page.

IZM Circuit-Breaker

Change or replacement of the XZM

Announcement of circuit-breaker modification

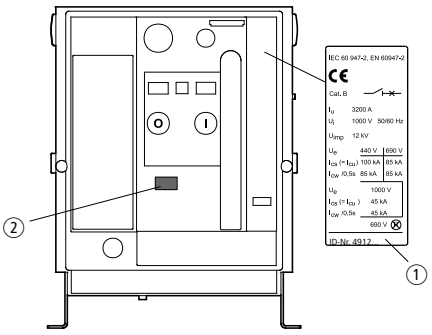
Moeller GmbH
After Sales Service
Hein-Moeller-Straße 7-11
53115 Bonn

FAX: + 49 (0) 228 602-1789

Customer:

IZM Circuit-Breaker:

ID No.:	①
Typ:	②
ID No. of the XZM:	③

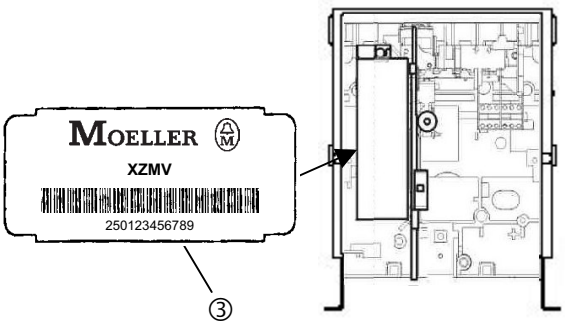


Replaced by XZM:

ID No. of the XZM:	③

Function test:

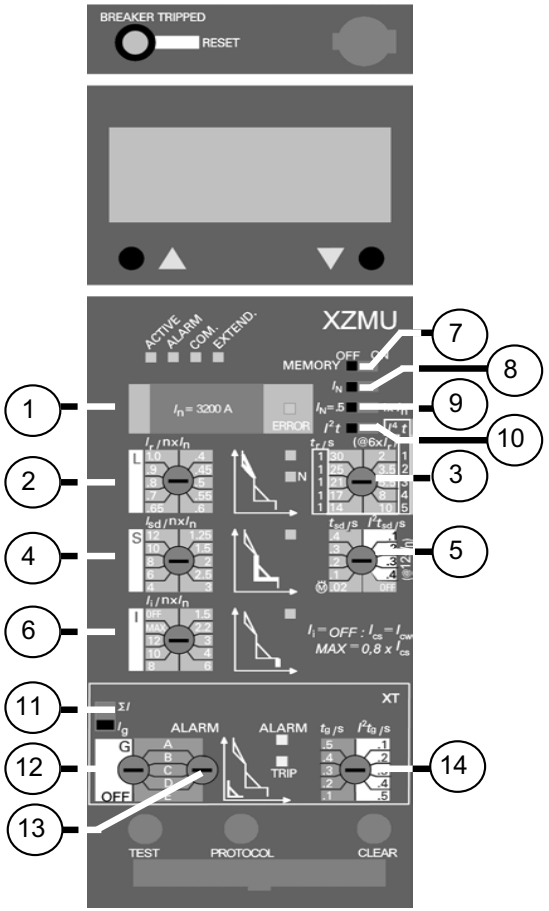
		Test passed: Yes / No [Test device, IZM-XPH]
Transformer test	L1	
	L2	
	L3	
	N	
	G	
Trip out test	L	
	S	
	I	
	N	
(Settings: Ig= OFF necessary)	G	



Name:	Department:
Date of training:	Place of IZM assembly training:
Date:	Signature:

IZM Circuit-Breaker

ID-number:



e.g. XZMU with IZMU-XT(A) and Display

	see (x)	XZMA	XZMV	XZMV+XT	XZMU	setting values
rated current	1	$I_{n\,max}$	✓	✓	✓	I_n= A
L Overload protection						
Current settings	2	✓	✓	✓	✓	I_R = x I_n
Delay	3	fix	fix	fix	✓	t_R = s
Characteristic	10				✓	❒ I^2t ❒ I^4t
Thermal memory	7				✓	❒ OFF ❒ ON
Fixed instantaneous, short time delay						
S Fixed instantaneous, short time delay						
Current settings	4		✓	✓	✓	I_{sd} = x I_n
Short time delay, fix or	5		✓	✓	✓	t_{sd} = s
Short time delay, I^2t_{sd}	5				✓	t_{sd} = s
ZSI-module IZM-XEM-ZSI	extern				o	❒ YES ❒ NO
I Instantaneous short-circuit protection						
Current settings	6	✓	fix	fix	✓	I_i = x I_n
N Neutral conductor protection						
active / inactive	8			✓	✓	❒ OFF ❒ ON
Current settings	9				✓	I_N = x I_n
G Earth-fault protection						
Method of current detection	11				o	❒ Σ I ❒ ext.transformer
Current settings TRIP	12			✓	o	I_g = A
Current settings ALARM	13				o	I_g = A
Short time delay, fix or	14			✓	o	t_g = s
Short time delay, I^2t_g	14				o	t_g = s

✓ ... Standard
o ... Option

27 Abbreviations

$A_{1/2}$	Output information$_{1/2}$ (Mutual mechanical interlocking)
AC	Alternating current
AMP	AMP Incorporated, Harrisburg
ANSI	American National Standard Institute
AWG	American Wire Gauge
Break Contact	Normally closed contact
BSS	Breaker Status Sensor
COM.	Communication
COM-DP	Communication module
CONNECT	Connected position
CR	Closing release
DAC	Digital Analog Converter
DC	Direct current
DIN	German Industry Standard – Organization responsible for industrial standardization in the Federal Republic of Germany
DISCON	Disconnected position
$E_{1/2}$	Input information $_{1/2}$ (Mutual mechanical interlocking)
DF	Duty factor
ESD	Electrostatic sensitive device
EN	European standard
ERROR	Trip unit error
EXTEND.	Extended protective function
F5	Tripping magnet
G alarm	Earth fault alarm
G tripping	Earth-fault trip
G transformer S1	Earth-fault trip transformer connection S1 (k)
G transformer S2	Earth-fault trip transformer connection S2 (l)
I/O	Input/Output module
I^2t	Current dependancy of the delay time, according to the formula where the current squared multiplied by time is a constant
I^2t_g	Setting value of the current dependent delay time of the ground fault trip
I^2t_{sd}	Setting value of the current dependent delay time of the short-circuit trip
I^4t	Current dependancy of the delay time, according to the formula where the current to the power of four multiplied by time is a constant
I_{ab}	Load shedding response value
I_{an}	Load acceptance response value
I_{avg}	Present average of current
I_{avglt}	Long term average of current
I-trip	Instantaneous short-circuit tripping
I_{cs}	Rated short-circuit breaking capacity
I_{cu}	Rated ultimate short-circuit breaking capacity
I_{cw}	Rated short-time withstand current
ID	Identity number
IEC	International Electrotechnical Commission
I_g	Earth-fault protection response value
I_i	Setting value for non-delayed short-circuit trip
I_{IT}	Individual pole short-circuit test current (IT systems)
I_n	Rated current (Rating plug value)
I_N	N-conductor protection setting value
I_r	Setting value for the current dependent delayed overload trip
I_{sd}	Setting value of the short-time delayed short-circuit trip
I_{THD}	Distortion factor of current
I_u	Max. rated current of the circuit-breaker
L1	Phase 1
L2	Phase 2
L3	Phase 3
L-trip	Delayed current dependent overload trip
LED	Light emitting diode
N/C	Normally closed contact (break contact)
N	Neutral conductor
N tripping	Trip caused by overcurrent in the N-conductor
N/O	Normally open contact (make contact)
N transformer S1	Neutral conductor transformer connection S1
N transformer S2	Neutral conductor transformer connection S2
N/C	Normally closed contact
PG	Parameter assignment module
S	Normally open contact
$S_{1/2/3}$	Circuit-breaker$_{1/2/3}$ (Mutual mechanical interlocking)
S1	Contact position-driven auxiliary switch
S2	Contact position-driven auxiliary switch
S3	Contact position-driven auxiliary switch
S4	Contact position-driven auxiliary switch
S7	Contact position-driven auxiliary switch
S8	Contact position-driven auxiliary switch
S11	Motor end position switch
S13	Cut-off switch for remote-reset
S14	Cut-off switch for overexcited shunt release XA (fast operation)
S15	Cut-off switch for overexcited closing release XE (fast operation)
S30	Signalling switch for disconnected position
S31	Signalling switch for test position
S32	Signalling switch for test position
S33	Signalling switch for connected position
S34	Signalling switch for connected position
S35	Signalling switch for connected position
S40	BSS-signalling switch for “ready-to-close”
S41	BSS-signalling switch for “storage spring charged”
S42	BSS-signalling switch for 1st voltage release
S43	BSS-signalling switch for 2nd voltage release
S44	BSS-signalling switch for “main contacts ON/OFF”

S45	BSS-trip signalling switch
S46	XCOM-DP-signalling switch for connected position
S47	XCOM-DP-signalling switch for test position
S48	XCOM-DP-signalling switch for disconnected position
S-trip	Short-time delayed short-circuit trip
t_d	Undervoltage release delay time
TEST	Test position
t_g	Delay time for the earth-fault release
t_r	Delay time for overload release (defined at 6 × I_r)
TRIP G	Reason for last trip due to earth-fault
TRIP I	Reason for last trip due to short-circuit (non-delayed)
TRIP L	Reason for last trip due to overload in a main conductor
TRIP N	Reason for last trip due to overload in a N-conductor
TRIP S	Reason for last trip was short-circuit (delayed)
t_{sd}	Delay time of the short-circuit release
t_x	Common load monitoring delay time
U_e	Rated operational voltage
U_i	Rated insulation voltage
U_{imp}	Rated impulse withstand voltage
U_s	Rated control circuit voltage
U_{THD}	Distortion factor of voltage
UVR	Undervoltage release (non-delayed)
UVR td	Undervoltage release (delayed)
VDE	German association for electrical, electronic and information technologies
VR	Voltage release
VT	Voltage transformer
WAGO	WAGO (Manufacturer of contacts in Munich)
X	Terminal designation
X...	Name of accessories
XA	1st shunt release
XA1	2nd shunt release
XAM	4-line display
XATA...	Flange connection
XAT(1)F...	Front connection
XATV...	Vertical connection
XAV...	Withdrawable unit
XAVE	Reserve switch for withdrawable unit
XCE	Coding facility for withdrawable unit
XCOM-DP	Communication module
XDT	Shrouding cover IP55
XE	Closing release
XEE	Electrical ON
XEM	Expansion module
XFR	Remote reset coil
XHB(G)	Cover for setting buttons
XHIA	Tripped signalling switch
XHIAV1(2)	Position signalling switches for withdrawable unit
XHIB	Signalling switch for ready-to-close
XHIF	Signalling switch storage spring charged
XHIS	Signalling switch 1st voltage release
XHIS1	Signalling switch 2nd voltage release
XIKL	Shutter
XKL...	Auxiliary conductors
XLKA-AV	Arcing chamber cover for withdrawable unit
XM	Motor
XMP(H)	Measurement modules
XMS	Motor cut-off switch
XMV...	Mechanical interlocking
XOW	Automatic reset of the mechanical reclosing lockout
XPH	Hand-held test unit
XPV	Emergency-Stop actuator
XRP...	Rating plug
XRT	Door seal
XSZ	Operations counter
XT	Earth-fault protection
XTA	Earth-fault protection, alarm only
XTW	Mounting brackets for fixed mounted circuit-breakers
XU	Undervoltage release
XUS	Fixed mounting conversion kit for withdrawable units
XUV	Undervoltage release, delayed
XV...	Locking devices and interlocks
XW05U...	Voltage transformers
XW(C)	Current transformer for N-conductor
XZM...	Electronic trip unit, overcurrent release
ZSI	Module zone selective interlocking

28 Glossary

Automatic reset of reclosing lockout
In order to re-establish the ready-to-close state immediately after an overcurrent tripping, an automatic mechanical reset unit is available as an option.

BSS module
Breaker Status Sensor – for collecting circuit-breaker status information via signalling switches and transmitting these data to the internal system bus.

Closing release
Electrical activation of the stored energy.

Coding of auxiliary connectors
To prevent interchanging the auxiliary wiring connections by mistake, the auxiliary connectors of the fixed-mounted circuit-breaker could be coded.

Communication module XCOM-DP
Interface adapter for:

– Converting the signals of the internal system bus to PROFIBUS-DP signals and vice versa
– Offer three potential free outputs for control functions (ON, OFF, 1 x free available)
– One input, freely usable for control information from the switchgear Additional function for withdrawable circuit-breaker:
– Detecting the circuit-breaker position in the withdrawable technique by means of signalling switches S46, S47 and S48.

Electrical closing lockout, shunt release with 100 % duty ratio
For electrical interlocking of two or more circuit-breakers (closing interlock). The electrical switch-on interlock blocks against switching on of the circuit-breaker with a constant signal.

Electrical ON
Elecrical operation of the charged spring via the closing release.

Guide rails
Are used to remove the circuit-breaker from the withdrawable unit.

I/O module
Input and output module

Internal system bus
Bus system close to the circuit-breaker for connection of the communication modules with each other and for connection to a panel bus (PROFIBUS-DP).

Commincation modules are :

– Overcurrent release XZMU, XZMR und XZMD
– Metering module XMP und XMH
– Breaker Status Sensor XBSS
– Communication module XCOM-DP
– External expansion module XEM...
– Parameterisation module XEM-PG und XEM-PGE

Laminated contacts
Connect the main terminals of the circuit-breaker with the main terminals of the withdrawable technique.

Locking in OFF (Safe OFF)
With this additional function prevents closing of the circuit-breaker and fulfils the disconnection conditions in the OFF position according to IEC 609472.

– “Mechanical OFF” button pressed
– Main contacts open
– Crank handle of withdrawable circuit-breaker is inserted
– The various locking conditions are fulfilled

Mechanical reclosing lockout
After overcurrent trip the circuit-breaker is blocked against reclosing until the mechanical reclosing lockout is reset by hand. An optional automatic reset of the mechanical reclosing lockout is possible.

Motor operating mechanism
The geared motor charges the storage spring automatically as soon as voltage is applied to the auxiliary connections. After closing, the storage spring is automatically charged for the next closing operation.

Mutual mechanical interlocking
The simultaneous mechanical and electrical switch-on of two (or three) circuit-breakers is not possible. Various variations of mutual interlocking of the circuit-breakers are possible.

Normal auxilliary contact = Standard auxilliary contact
Actuation of the auxiliary switch depends on the switching status of the circuit-breaker/main contacts

Parameter assignment module
Makes it possible to parameterize, operate and observe the circuit-breaker without additional software by means of an input/output unit with browser features (e.g. a notebook).

Position indication
To display the circuit-breaker position in the withdrawable unit.

Position signalling switch
For remote display of the circuit-breaker position in the withdrawable unit.

Rating Plug
This module determines the setting range of the overload protection and consequently the short-circuit protection. Using this module the rated current of the curcuit-breaker can be reduced (e.g. for a part commissioning).

Ready to switch on
The device is ready to switch on when:

– the circuit-breaker is in the OFF switch position
– the spring energy storage mechanism is charged
– the undervoltage release is energized
– the shunt release is de-energized
– the electrical manual reset is de-energized
– the reset button has been reset after an overcurrent trip
– the key switch is not set to OFF
– the crank handle is inserted
– mutual mechanical interlocking is not effective

Remote reset
Using the optional remote reset coil the electrical signal of the tripped sigmalling switch and the red reset pin can be reset.

Rogovski coil
Sensor for recording the current

Safe OFF
→ “Locking in OFF”

Shunt release
To switch off the circuit-breaker remotely and for locking against closing.

Shutter
Shutters are movable insulated plates that cover the main current conductors in the withdrawable unit (protection against direct contact).

Spring charging lever
The storage spring is charged by several pumping operations.

Storage spring
Module containing a spring as an energy store. The spring is charged by means of a manual lever or a motor and latched in charged condition. When the latches are released, the stored energy is transmitted to the pole, the circuit-breaker closes.

Supply transformers
Power supply for the overcurrent release.

Tool operation
Pushbuttons can only be pressed with a rod through a cover with a hole (∅ 6.35 mm).

Trip signalling switch
Group signal for overload, short-circuit and earth-fault tripping by micro-switch.

Undervoltage release
For remote switching and locking of the circuit-breaker. With the use of the circuit-breaker in Emergency-Stop circuits (to EN 60204-1) together with a seperately arranged Emergency-Stop facility, short voltage dips should not cause the circuit-breaker to switch off. (e.g. motor start-up).

Undervoltage release (delayed)
For remote switching and locking of the circuit-breaker. Voltage dips should not cause a tripping of the circuit-breaker (e.g. switch-overs in the mains supply).

Voltage release
Undervoltage releases and shunt releases are available for use. To switch off the circuit-breaker remotely and for locking against closing.

Withdrawable unit coding device
To guard against the possibility that in a switchboard circuit-breakers of the same physical size but of different versions can be incorrectly inserted into the withdrawable units, circuit-breakers and withdrawable units can be fitted with a coding device.

Withdrawable unit rated current coding
A rated current coding is carried out before delivery. That means, every circuit-breaker can only be inserted into a withdrawable unit with the same rated current.

ZSI, zone-selective interlocking
The ZSI minimises considerably the stresses in the switchboard with a short delay time of 50 ms depending upon what position the short-circuit occurrs.

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